

भेरी पम्पिङ उप-आयोजनाको वातावरणीय र सामाजिक प्रभाव मूल्यांकन

कार्यकारी सारांश

परिचय र पृष्ठभूमि

भेरी पम्पिङ उप-आयोजना नेपाल सरकार र विश्व बैंकको सहकार्यमा सञ्चालन हुन लागेको खानेपानी क्षेत्रगत सुशासन तथा पूर्वाधार सहयोग आयोजना (WaSGISP) अन्तर्गतको उप-आयोजना हो। भेरी पम्पिङ उप-आयोजना प्याकेज-१ भनिने यो आयोजना कर्णाली प्रदेश अन्तर्गतको सुर्खे जिल्लाको वीरेन्द्रनगर र लेकबेंशी नगरपालिका क्षेत्रमा निर्माण हुनेछ। यस उप-आयोजनाले वीरेन्द्रनगर नगरपालिका वडा नं. १, २, ३, ४, ६, ८, ९, १०, ११ र १२ र लेकबेंशी नगरपालिका वडा नं. १० को क्षेत्र समेट्नेछ। यस उप-आयोजना अन्तर्गत निर्माण गरिने मुख्य कार्यहरू मध्ये भेरी नदी किनारमा इन्टेक, पानी प्रशोधन केन्द्र, रिजर्भ्वायर (RVT) र थोक वितरण (Bulk Distribution) प्रणाली पर्दछन्। भेरी नदीमा साइड इन्टेक र लेकबेंशी नगरपालिका वडा नं. १० मा खानेपानी प्रशोधन केन्द्रको निर्माण हुनेछ भने वीरेन्द्रनगर नगरपालिका वडा नं. १, २, ३, ४, ६, ८, ९, १०, ११ र १२ मा ठूला रिजर्भ्वायरहरू (RVTs), पाइपलाइन, प्रसारण लाइन र थोक वितरण प्रणाली लगायतका पूर्वाधार निर्माण हुनेछन्। आयोजना कार्यान्वयनको सन्दर्भमा, उप-आयोजना निर्माण अवधिभर संघीय, प्रादेशिक र स्थानीय सरकार बीच उचित समन्वय र सहकार्य हुन आवश्यक छ। जनगणना २०२१ अनुसार वीरेन्द्रनगर नगरपालिकाको कुल जनसङ्ख्या १,५३,८६३ छ, जसमध्ये पुरुष ७५,१२९ र महिला ७८,७३४, र कुल घरधुरी ३८,३७७ रहेका छन्। यसैगरी लेकबेंशी नगरपालिका वडा नं. १० को कुल जनसङ्ख्या ३७५० (पुरुष १८१० र महिला १९४०) र घरधुरी ८४६ रहेको छ। कर्णाली प्रदेशमा ७०.४५ प्रतिशत जनसङ्ख्याको आधारभूत खानेपानी सुविधामा पहुँच छ भने सुर्खेत जिल्लामा ये दर ७६.५३ प्रतिशत रहेको छ।

वातावरणीय र सामाजिक प्रभाव मूल्याङ्कन (ESIA) अध्ययनको उद्देश्य

यस उप-आयोजनाको वातावरणीय र सामाजिक प्रभाव मूल्याङ्कन (ESIA) को प्रमुख उद्देश्य नेपाल सरकार र विश्व बैंक दुवैको वातावरणीय र सामाजिक मापदण्ड (ESS) को आधारमा वातावरणीय र सामाजिक जोखिम र प्रभावहरूको पहिचान, मूल्याङ्कन र व्यवस्थापन गर्नु हो। यस अध्ययनले पहिचान गरिएका जोखिम र नकारात्मक प्रभावहरूलाई हटाउन मद्दत गर्ने लक्ष्य राखेको छ र जहाँ यस्ता जोखिम र नकारात्मक प्रभाव पूर्ण रूपले हटाउन सम्भव छैन, त्यसलाई स्वीकार्य मात्रामा न्यूनीकरण गर्ने वा घटाउने लक्ष्य राखिएको छ। प्रभावहरू न्यूनीकरण गर्न सम्भव नभएका अवस्थामा, प्राविधिक र आर्थिक रूपमा व्यावहारिक छन् भने यो मूल्याङ्कनले क्षतिपूर्ति वा अन्य विकल्पहरू खोज्छ। ESIA को थप उद्देश्य आदिवासी जनजातिहरू सहित पिछडिएका समुदायहरूको गहन विश्लेषण गर्नु र उनीहरूको सामाजिक चासो र सुझाव सम्बन्धित उप-आयोजनाको डिजाइनमा समावेश गर्ने रणनीतिहरू प्रस्ताव गर्नु रहेको छ।

नीति, कानुनी र प्रशासनिक खाका

भेरी पम्पिङ उप-आयोजना (प्याकेज-१) का लागि गरिएको वातावरणीय र सामाजिक प्रभाव मूल्याङ्कन (ESIA) विश्व बैंकको वातावरणीय र सामाजिक फ्रेमवर्क (ESF), खानेपानी क्षेत्रगत सुशासन तथा पूर्वाधार सहयोग आयोजना (WaSGISP) को वातावरणीय र सामाजिक व्यवस्थापन फ्रेमवर्क (ESMF) र नेपाल सरकारको वातावरण संरक्षण ऐन २०७६ र वातावरण संरक्षण नियमावली २०७७ मा उल्लिखित प्रावधानहरूको आधारमा गरिएको हो। ESIA अध्ययनले उप-आयोजनाको निर्माण गतिविधिहरूसँग तिनिहरूको अनुकूलता मूल्याङ्कन गर्न उपयुक्त ढाँचा, दिशानिर्देश, मापदण्ड र नीतिहरूको विस्तृत परीक्षण समावेश गर्दछ।

विधि

वातावरणीय र सामाजिक प्रभाव मूल्याङ्कन (ESIA) को तयारीका क्रममा गरिएका प्रमुख गतिविधिहरू (क) वातावरण र सामाजिक परीक्षण, (ख) सम्भावित वातावरणीय र सामाजिक जोखिम र प्रभावहरूको मूल्याङ्कन, (ग) वातावरण र सामाजिक व्यवस्थापन योजना (ESMP) को तयारी, (घ) वातावरणीय र सामाजिक प्रभाव मूल्याङ्कन प्रतिवेदन (ESIA) तयारी (ङ) सार्वजनिक परामर्शबाट उठेका मुद्दाहरू समावेश, (च) ESIA प्रतिवेदन पेश, (छ) टिप्पणी र सुझावहरू समावेश, (ज) स्वीकृतिका लागि विश्व बैंक र खानेपानी तथा ढल व्यवस्थापन विभाग (DWSSM) लाई आवश्यक परिमार्जन सहित अन्तिम ESIA प्रतिवेदन पेश गर्ने रहेका छन्। यस उप-आयोजनाका लागि तयार गरिएको ESIA ले प्रत्यक्ष र अप्रत्यक्ष प्रभाव मात्र नभई अन्य छुटपुट प्रभावहरूको सम्भावनालाई पनि विचार गरेको छ।

आयोजना क्षेत्रको विद्यमान वातावरणीय अवस्था

भौतिक वातावरण

वीरेन्द्रनगर नगरपालिकाको कुल क्षेत्रफलको ५४.२८५ प्रतिशत जंगलले ढाकेको छ भने कुल नगरपालिका क्षेत्रको २२.१० प्रतिशत कृषियोग्य जमिनले ओगटेको छ। सार्वजनिक सेवा क्षेत्र र आवासीय क्षेत्रले कुल क्षेत्रफलको क्रमशः १.९६ प्रतिशत र २.२१ प्रतिशत ओगटेको छ। नगरपालिका क्षेत्रको १.५९ प्रतिशत नदी र ताल क्षेत्रले ओगटेको छ। अन्य व्यावसायिक, सांस्कृतिक, पुरातात्विक र औद्योगिक क्षेत्रहरूले नगरपालिका क्षेत्रको १ प्रतिशत ओगटेको छ। यस उप आयोजना क्षेत्रमा उत्तरी र दक्षिणी चुरे पहाडबाट निस्कने बालुवा, थिग्रान, माटो, ढुङ्गा र गिट्टी छन्। यस उप-आयोजना क्षेत्रको उचाइ न्यूनतम ३४२ मिटरदेखि अधिकतम २,२५२ मिटरसम्म रहेको छ र यस क्षेत्रमा सम-शीतोष्ण हावापानी छ। कर्णाली प्रदेशमा औसत अधिकतम तापक्रम ७ डिग्री सेल्सियस देखि २३ डिग्री सेल्सियस र न्यूनतम तापक्रम -७ डिग्री सेल्सियसदेखि १३ डिग्री सेल्सियससम्म रहन्छ। यो उप-आयोजना क्षेत्र माथिल्लो चुरे क्षेत्र अन्तर्गत पर्दछ। माथिल्लो चुरे क्षेत्रले वीरेन्द्रनगर नगरपालिकाको करिब १.६७ प्रतिशत ओगटेको छ र यो क्षेत्र नगरपालिकाको दक्षिणी भागमा रहेको छ। यस क्षेत्रमा अपरिपक्व र कमजोर चट्टानहरू रहेको हुनाले उच्च पानी बहावका कारण सजिलै भू-क्षय हुनसक्ने सम्भावना पनि देखिन्छ। भारी वर्षाका समयमा यस क्षेत्रमा पहिरो जाने जोखिम रहेको छ। पहिले नै यस क्षेत्रमा जमिन धाँजा फाटेको अथवा चर्किएको कारणले घना वर्षा हुँदा पहिरो र भू-क्षय हुने सम्भावना बढेर गएको पाइन्छ। वीरेन्द्रनगर नगरपालिका इत्राम, खोर्के, नेवारे, टुनी, सोतखोला जस्ता धेरै खोलाहरू रहेका छन्। यी खोलाहरू हिउँदमा प्रायः सुख्खा रहन्छन् तर मनसुनमा आउने बाढीले भूक्षय हुने समस्या देखिने गर्दछ। सुख्खा मौसममा यी नदीनाला र जमिनमुनिको पानीको संयुक्त प्रवाह लगभग ८०६४ घ. मि. प्रतिदिन हुन्छ। वातावरणीय र सामाजिक प्रभाव मूल्याङ्कन (ESIA) गर्ने समयमा उप-आयोजना क्षेत्रमा हावाको गुणस्तर, पानीको गुणस्तर र ध्वनिको स्तरको अनुगमन गरीट् तथांक लिइएको थियो। मूल्याङ्कनका क्रममा इन्टेक र पानी प्रशोधन केन्द्र साइटमा सबैभन्दा कम AQI मात्रा र कण वस्तुको मात्रा क्रमशः ३२ AQI र २१.१ ug/m³ मा रेकर्ड गरिएको थियो। यसबाहेक अमृतडाँडा (RVT निर्माण स्थल) मा AQI र PM 2.5 मात्रा क्रमशः ३७ AQI र २३.६ ug/m³ मा रेकर्ड गरिएको थियो। थोक (Bulk) वितरण लाइनको अन्तिम स्थान बाङ्गोसिमल भन्ने ठाँउमा AQI र PM 2.5 मात्रा क्रमशः ४६ AQI र २४.१ ug/m³ अवलोकन गरियो। पानी गुणस्तर परीक्षण मार्फत १२ प्यारामिटरहरू (Parameters) नेपाल खानेपानी गुणस्तर मापदण्ड (NDWQS 2079) अनुसार विश्लेषण गरियो। विश्लेषणको नतिजाले धमिलोपन (Turbidity) स्तर उच्च भएको र यसले NDWQS मा तोकिएको स्वीकृत सीमालाई पार गरेको पाइयो। ध्वनिको स्तर हेर्दा इन्टेक र पानी प्रशोधन केन्द्र क्षेत्रमा ४४ डेसिबल, अमृतडाँडामा ४५ डेसिबल र बाङ्गोसिमलमा ५५ डेसिबल रेकर्ड गरिएको थियो।

जैविक वातावरण

वीरेन्द्रनगर नगरपालिकामा प्रशस्त वनक्षेत्र र जैविक विविधता रहेको छ । यस उप- आयोजना निर्माणका लागि कुल ३.२२ हेक्टर क्षेत्र आवश्यक पर्दछ, जुन रानीचौतारी, शिवशक्ति, ऐश्वर्य र भेरी गरी चार वटा सामुदायिक वनमा क्षेत्रमा पर्दछ । यी सामुदायिक वन क्षेत्रमा रत्न राजमार्ग (नेपालगञ्ज-सुर्खेत राजमार्ग) पर्ने, नजिकै बस्तीहरू रहेका र त्यहाँ मानिसहरूको बढी नै चहलपहल हुने भएकाले यो क्षेत्र वन्यजन्तुका लागि प्राथमिक वासस्थान होइन । यसबाहेक निर्माण हुने इन्टेकमा बाँध निर्माण आवश्यक नपर्ने भएकाले उप- आयोजना क्षेत्रमा रहेका जलचर पनि प्रभावित हुने छैनन् । सम्भावित रूपमा जलीय जीवनमा बाधा पुऱ्याउन सक्ने कुनै पनि संरचना निर्माणका लागि प्रस्ताव गरिएको छैन । आयोजना क्षेत्रमा पाइने रुख प्रजातिहरूमा साल, बोडधाइरो, ढाल्ने कटुस, भलायो, आसना, सल्लो आदि हुन् । त्यसैगरी सानो न्याउरी मुसो, जङ्गली बिरालो, लोखर्के, मुसा, स्याल, ओलिभर किलब्याक पानी सर्प, छेपारो, पाहा, असला माछा, महसीर आदि यस आयोजना क्षेत्रमा पाइने केही जीवजन्तु तथा जलचर/उभयचरका प्रजातिहरू हुन् । ESIA सर्वेक्षण अनुसार उप- आयोजना क्षेत्रमा कुनै लोपोन्मुख, दुर्लभ, वा खतरामा परेका प्रजातिहरू फेला परेका छैनन् ।

सामाजिक आर्थिक तथा सांस्कृतिक वातावरण

आयोजना क्षेत्रभित्रको बसोबासमा विविधता छ । वीरेन्द्रनगर नगरपालिका कर्णाली प्रदेशको राजधानी भएकोले केही वर्षयता नजिकैका गाउँ र अन्य जिल्लाबाट यस क्षेत्रमा बसाइँ सर्ने क्रम पनि बढेको छ । जनगणना २०२१ अनुसार यस नगरपालिकाको कुल जनसङ्ख्या १,५३,८६३ (पुरुष ७५,१२९ र महिला ७८,७३४) र कुल घरधुरी ३८,३७७ रहेका छन् भने लेकबेंशी नगरपालिका वडा नं. १० को कुल जनसङ्ख्या ३७५० (पुरुष १८१० र महिला १९४०) र घरधुरी ८४६ रहेको छ । राष्ट्रिय जनगणना २०२१ अनुसार आयोजना प्रभावित क्षेत्रमा ब्राह्मण र क्षेत्री समूह कुल जनसङ्ख्याको ६१ प्रतिशत ओगटेको सबैभन्दा धेरै जनसङ्ख्या भएको जाति हो । आयोजना क्षेत्रको अधिकांश जनसङ्ख्या (९१ प्रतिशत) हिन्दू धर्म मान्छन्, त्यसपछि इसाई धर्म (३.८० प्रतिशत), बौद्ध (३.४ प्रतिशत), इस्लाम (१.५ प्रतिशत), अन्य (०.२ प्रतिशत) छन् । आयोजना क्षेत्रका अधिकांश जनसङ्ख्याले नेपाली (९३ प्रतिशत), त्यसपछि थारु (३.२५ प्रतिशत), मैथिली (१.६६ प्रतिशत), मगर (१.२० प्रतिशत) र अन्य भाषा बोल्छन् । औसतमा वीरेन्द्रनगर नगरपालिकाको साक्षरता दर कुल जनसङ्ख्याको ८७.२५ रहेको छ, जसमा ९२.७ प्रतिशत पुरुष र ८२ प्रतिशत महिला साक्षर छन् । हालैको अध्ययनअनुसार आयोजना क्षेत्रको २८.२१ प्रतिशत जनसङ्ख्या नोकरीमा संलग्न छ, त्यसपछि १९.९० प्रतिशत कृषिमा, १७.६८ प्रतिशत व्यापारमा, १७.३४ प्रतिशत ज्याला श्रममा, ४.७८ प्रतिशत वैदेशिक रोजगारीमा, ५ प्रतिशत उद्योगमा र बाँकी ७.०९ प्रतिशत अन्य क्षेत्रमा छन् ।

वर्तमान समयमा जनसङ्ख्या वृद्धि र पानीका स्रोतको घट्दो प्रवृत्तिका कारण विद्यमान खानेपानी प्रणालीले खानेपानी तथा सरसफाइको माग पर्याप्त मात्रामा पूर्ति गर्न सकिरहेको छैन । खानेपानी तथा सरसफाइको अवस्था हेर्दा १८,००० भन्दा बढी घरधुरी अझै पनि खानेपानीको पर्याप्त पहुँचबाट वञ्चित छन् । त्यसैगरी ६६.३ प्रतिशत घरपरिवारको मात्र आधारभूत सरसफाइ सुविधामा पहुँच छ ।

रत्न राजमार्गको नजिक झुप्रा नदीको किनारमा र झुप्रा र भेरी नदीको सङ्गमबाट करिब ५०० मिटर माथि वादी बस्ती अवस्थित छ । यस क्षेत्रका प्रमुख बासिन्दाहरू वादी (दलित) समुदायका छन्, र अन्य दलित सदस्यहरू पनि छन् । यसबाहेक अन्य जातका केही घरपरिवारहरूको पनि यस बस्तीमा बसोबास रहेको छ । यस बस्तीमा कुल १२४ घरपरिवारको बसोबास रहेको छ र उनीहरूको आम्दानिको मुख्य स्रोत झुप्रा नदीबाट नदीजन्य पदार्थहरू निकासी गर्ने हो । लेकबेंशी नगरपालिका वडा नं. ९ मा अवस्थित थारुबास गाउँ यो प्रस्तावित इन्टेक क्षेत्रको सबभन्दा नजिकको बस्तीमा पर्दछ, जहाँ प्रस्तावित इन्टेक क्षेत्रबाट २५ मिनेटको पैदल दूरीमा पुग्न सकिन्छ । कुल ६ घरपरिवार र २३ जनसङ्ख्या भएको यस गाउँमा ठकुरी र जनजातीस (आदिवासी) दुवै घरपरिवारहरू बस्छन् । यस उप-आयोजना क्षेत्र वरपर, देउती बज्यै नामले चिनिने हिन्दू मन्दिर पनि अवस्थित छ, जुन राजी समाजसँग सम्बन्धित राष्ट्रिय सम्पदा हो ।

सरोकारवालाहरूको संलग्नता र सार्वजनिक परामर्श

यस प्रतिवेदनको तयारीको क्रममा मुख्यतः दुई महत्वपूर्ण उद्देश्यहरूका लागि परामर्श बैठकहरूको आयोजना गरिएको थियो: (क) पहिचान गरिएका सरोकारवाला समूहहरूलाई उप-आयोजनाका उद्देश्यहरू र उप-आयोजनासँग सम्बन्धित क्रियाकलापहरूको जानकारी गराउन (ख) सरोकारवालाहरूसँग परामर्श गरी उनीहरूको सरोकारलाई प्रस्तावित उप-आयोजनाको सामाजिक र वातावरणीय प्रभावहरूको सन्दर्भमा अभिलेखीकरण गर्न। ESIA तयार गर्न वीरेन्द्रनगर नगरपालिकाको आयोजना कार्यान्वयन इकाई (PIU) ले विभिन्न सरोकारवालाहरूसँग परामर्श बैठक समन्वय गर्ने जिम्मेवारी लिएको थियो। सम्बन्धित सरोकारवालाहरूलाई जानकारी गराउन बुलबुले सामुदायिक रेडियो र मोबाइल एसएमएस (SMS) मार्फत सार्वजनिक सूचनाहरू प्रसारण गरिएको थियो। यस उप-आयोजनाबाट प्रभावित हुन सक्ने विभिन्न सरोकारवालाहरू, विशेष गरी आदिवासी जनजाति (IP) समूहहरू, दलित समूहहरू र अन्य जोखिममा परेका र सीमान्तकृत समुदायहरूको संलग्नता र विचार सुनिश्चित गर्न एक व्यापक र समावेशी परामर्श प्रक्रिया अपनाइएको थियो। यसका लागि दलित महिला संघ (FEDO), सामुदायिक वन उपभोक्ता समूह (CFUG), खानेपानी, सरसफाइ तथा स्वच्छता (WASH) सँग सम्बन्धित संस्थाहरू, सरकारी निकायहरू र केही आयोजना प्रभावित परिवारहरूसँग पनि समन्वय गरिएको थियो। यसको उद्देश्य चाँहि तिनीहरूको अर्थपूर्ण र सांस्कृतिक रूपमा उपयुक्त परामर्शको दृष्टिकोण सङ्कलन र तिनीहरूको चासोलाई सम्बोधन गर्ने थियो। ठूलो संख्यामा समुदायका सदस्यहरूलाई संलग्न गराउन सामूहिक भेलाहरू आयोजना गरियो, जहाँ आयोजनाको विवरणहरू र सम्भावित प्रभावहरूका बारेमा पनि छलफल गरियो। व्यक्ति र समूहबाट थप विशिष्ट र विस्तृत प्रतिक्रिया सङ्कलन गर्न धेरै लक्षित समूह छलफल (FGD) र अन्तर्वार्ताहरू सञ्चालन गरियो। थप रूपमा उप-आयोजना गुनासो सम्बोधन संयन्त्र (GRM) स्थापना गरिएको छ, जसले उप-आयोजना निर्माण अवधिमा उत्पन्न हुन सक्ने विवादहरू सम्बोधन गर्न सहयोग पुर्याउँछ। सरोकारवालाहरूको संलग्नता र सार्वजनिक परामर्श (SEP) का लागि रु ५०,५०,००० रुपैयाँ विनियोजन गरिएको छ।

वातावरण र सामाजिक जोखिम र प्रभाव

वातावरणीय र सामाजिक प्रभावहरू कुनै पनि आयोजना वा नीतिका महत्वपूर्ण पक्षहरू हुन, किनभने मानव गतिविधिहरूले प्राकृतिक वातावरण र आयोजना क्षमसोबास गर्ने समुदायहरूमा पार्न सक्ने प्रभाव र असरहरूलाई समेट्छ। उप-आयोजनाको स्क्रिनिङको (Screening) को क्रममा विभिन्न संभावित असरहरू पहिचान गरिएको छ। इन्टेक, पानी प्रशोधन केन्द्र, पानी टंकीहरू, र प्रसारण लाइनका लागि प्रस्तावित साइट सामुदायिक वन क्षेत्र भित्र पर्दछ र निर्माण कार्यका लागि प्रस्तावित साइटमा ७६५ वटा रुखहरू र १०२१ वटा जति पोल काट्नु पर्ने हुन्छ। यस उप-आयोजनाका लागि वातावरणीय र सामाजिक प्रभावहरूमा श्रमिक शिविर (Labor Camp) क्षेत्रबाट सम्भावित ठोस फोहोर व्यवस्थापन, दिसाजन्य लेदो विसर्जन, प्राकृतिक जल निष्काशनमा अवरोध, ट्राफिक जाम, पेशागत स्वास्थ्य र सुरक्षा सम्बन्धी चासोहरू, लैङ्गिक र कमजोर समूहहरूमा प्रभाव, लैंगिक आधारित हिंसा (GBV) र यौन शोषण र दुर्व्यवहार/यौन उत्पीडन (SEA/SH) सम्बन्धी मुद्दाहरू समावेश छन्। यसैगरी सांस्कृतिक सम्पदामा पर्ने असर, सामुदायिक स्वास्थ्य तथा सुरक्षा सरोकारका साथै बाल तथा जबरजस्ती श्रममा पर्ने असर र निर्माण चरणमा हुन सक्ने जल प्रदूषणका साथै वायु प्रदूषण, आयोजना सञ्चालनका चरणमा निर्माण क्षेत्रबाट उत्पन्न हुने फोहोरको अव्यवस्थित विसर्जनले गर्दा हुन सक्ने जल प्रदूषण, इन्टेक साइटमा हुन सक्ने ध्वनि प्रदूषण र कम्पनका साथै लैङ्गिक तथा जोखिममा परेका समूहमा पर्ने असरहरू मुख्य हुन्।

वातावरणीय र सामाजिक प्रभाव मूल्याङ्कन (ESIA) मार्फत आयोजनाको भौतिक, जैविक र सामाजिक-आर्थिक प्रभावहरू पहिचान गरिएको छ र यी प्रभावहरूलाई सम्बोधन गर्न वातावरणीय र सामाजिक व्यवस्थापन योजना (ESMP) तयार गरिएको छ। यस वातावरणीय र सामाजिक व्यवस्थापन योजना (ESMP) मा निम्नलिखित पक्षहरू समावेश गरिएका छन्: (क) अपेक्षित वा अनुमानित वातावरणीय र सामाजिक प्रभावहरूका लागि न्यूनीकरणका उपायहरू (ख) निर्माण र सञ्चालन दुवै चरणका लागि सम्बन्धित सरोकारवालाहरूद्वारा अनुगमन योजना। आयोजना कार्यान्वयनको सम्भावित वातावरणीय र सामाजिक प्रभावहरूलाई न्यूनीकरण गर्न

डिजाइन विकल्पहरूमा काम गरिएको छ । प्रस्तावित केही प्रमुख वातावरणीय न्यूनीकरणहरू जस्तै प्रस्तावित साइटमा सतहको उत्खननको व्यवस्थापन गर्ने र प्रति रुख कटान बापत १० रुखको दरमा क्षतिपूर्तिको रूपमा वृक्षरोपण गर्ने । सामाजिक जोखिमहरूका लागि, प्रस्तावित केही प्रमुख सामाजिक सुरक्षा न्यूनीकरण उपायहरू आयोजना अवधिभर लैंगिक आधारित हिंसा (GBV) र यौन शोषण र दुर्व्यवहार र यौन उत्पीडन (SEA/SH) सम्बन्धी निरन्तर अनुगमन, परामर्श, स्थानीय वासिन्दाहरूको क्षमता निर्माण आदि पर्दछन् । सम्भावित वातावरणीय र सामाजिक प्रभाव र जोखिमहरूका लागि प्रस्तावित न्यूनीकरण उपायहरूको विवरण यस ESIA रिपोर्टको वातावरणीय र सामाजिक व्यवस्थापन योजना (ESMP) म्याट्रिक्समा उल्लेख गरिएको छ । साथै यी प्रस्तावित गतिविधिको समयसापेक्ष र नियमित अनुगमनका लागि अनुगमन योजना पनि तयार गरिएको छ । यस उप-आयोजनाको ESMP गतिविधिहरूका लागि रु १९,०४,५१,९१९.१९/ (अमेरिकी डलर १.४६ मिलियन) को बजेट प्रावधान गरिएको छ । यो रकम भेरी पम्पिङ उप आयोजनाको सिभिल कामको ठेक्का सम्झौता पत्रमा समावेश गरिनेछ ।

प्रतिकूल वा नकारात्मक प्रभावहरूका अतिरिक्त यस उप-आयोजनाका धेरै सकारात्मक प्रभावहरू पनि छन् । उप-आयोजनाले प्रदान गर्ने अपेक्षा गरिएको प्रमुख सकारात्मक प्रभावहरूमा दिगो खानेपानी आपूर्ति र सरसफाइमा सुधार, उप-आयोजना क्षेत्रमा रोजगारी सृजना, स्थानीय जनताको सीप अभिवृद्धि, स्थानीय व्यपार तथा व्यवसाय प्रवर्द्धन आदि मार्फत जनस्वास्थ्यमा सुधार ल्याउने हुन् ।

संक्षिप्त/द्रुत प्रभाव मूल्यांकन

यस संक्षिप्त/द्रुत प्रभाव मूल्यांकन (RCIA) को प्राथमिक उद्देश्य भेरी पम्पिङ उप- आयोजनाका कारण उत्पन्न हुन सक्ने सम्भावित समस्याहरू पहिचान गर्नु थियो । यस उप- आयोजनाका लागि संक्षिप्त/द्रुत प्रभाव मूल्यांकन (RCIA) ले स्थानीय विशेषज्ञहरू र सरकारी अधिकारीहरूसँग व्यापक परामर्श र एकमुष्ट प्रभाव मूल्यांकन (CIA) मा विशेषज्ञहरूबाट मार्गदर्शन सहित समावेश गरेको छ ।

फ्रेब्रुअरी २०२३ मा सुर्खेत उपत्यका जलाधर (Watershed) का लागि सम्भावित मुख्य वातावरणीय तथा सामाजिक सम्बन्धी द्रुत स्क्रीनिङ (Rapid Screening) गरिएको थियो । सम्भावित प्रभावहरूको मूल्यांकनका लागि गरिएको यो कार्यबाट पहिचान गरिएका वातावरणीय र सामाजिक सरोकार अनुसार पानीको गुणस्तर र मात्रा, वन र पर्यावरण प्राथमिक सरोकारका रूपमा निर्धारण गरिएको थियो ।

वर्तमान समयमा 'खानेपानी क्षेत्रगत सुशासन तथा पूर्वाधार सहयोग आयोजना' (WaSGISP) सुर्खेत उपत्यकामा आगामी ६ देखि १० वर्षसम्म खानेपानी तथा सरसफाइ गतिविधिहरूलाई सहयोग गर्ने स्रोत सुनिश्चित भएको एक मात्र आयोजना भएको देखिएको छ । त्यसो त समुदायले यस उपत्यकामा सडक पूर्वाधार, सामुदायिक सिंचाइ र बस्ती विकास जस्ता अन्य क्षेत्रहरूका लागि माग गर्दै आएको भए तापनि यी हालसम्म ती क्षेत्रहरूमा निश्चित स्रोत र योजनाको टुङ्गो लागेको छैन ।

हाल सुर्खेत उपत्यका जलाधर क्षेत्रमा भेरी बबई डाइभर्सन बहुउद्देश्यीय आयोजना (BBDMP) र कोहलपुर-सुर्खेत १३२ केभी प्रसारण लाइन आयोजना सञ्चालनमा छन् । BBDMP र भेरी पम्पिङ उप-आयोजनासँग सम्बन्धित भेरी नदीको उपयोगबाट पानीको गुणस्तर र परिमाणमा संयुक्त प्रभाव पर्ने देखिन्छ । BBDMP आयोजना पूरा भएपछि नदीमा बाँकी रहेको पानीमध्येबाट भेरी पम्पिङ आयोजनाले वर्षा याममा ०.००९ प्रतिशत र सुक्खा याममा ३.४९ प्रतिशत पानी मात्रै उपयोग गर्नेछ । यति मात्राको पानीको उपयोगबाट भेरी नदीको पानीको गुणस्तर र परिमाणमा ज्यादै नगण्य प्रभाव पर्ने देखिन्छ ।

कोहलपुर-सुर्खेत १३२ केभी प्रसारण लाइन आयोजना र भेरी पम्पिङ उप आयोजनाको प्रसारण लाइनमा पर्ने रुख तथा वनस्पति हटाउने कार्यले वन र पारिस्थितिकीय प्रणालीमा समग्र प्रभाव उत्पन्न हुने देखिन्छ । यसका लागि यस क्षेत्रका चारवटा सामुदायिक वनहरूबाट करिव ३,३०० रुखहरू र १,०२१ पोलहरू हटाउन आवश्यक छ, जुन कुल वन क्षेत्रको ०.३ प्रतिशत मात्रै हुन आउँछ । फलस्वरूप

पर्यावरण संरक्षण क्षति न्यूनीकरणका पर्याप्त उपायहरू अवलम्बन नगरी यी आयोजनाहरू सञ्चालन गरेको खण्डमा यसले सुर्खेत उपत्यकाको वन र पर्यावरणमा प्रभाव पर्ने सम्भावना छ ।

व्यवस्थापन रणनीतिले बहुआयामिक दृष्टिकोणबाट प्राथमिक वातावरणीय र सामाजिक सरोकारहरूमा देखा पर्ने प्रभावहरूलाई सम्बोधन गर्ने उद्देश्य लिएको छ । यस अन्तर्गत आयोजनाको नियन्त्रणमा रहेका उपायहरू WaSGISP, आयोजना कार्यान्वयन इकाइ (PIU) र विकासका अन्य साझेदारहरूले समावेश गर्दछन् । यस रणनीतिको मुख्य पक्ष WaSGISP को अवयव (component) ३ हो, जसले कम जोखिमयुक्त, साना र मध्यम स्तरको लगानी गर्छ र जलवायु सम्बन्धी जोखिमहरूलाई कम गर्नुका साथै खानेपानीका स्रोतहरूमा पानीको मात्रामा सुधार ल्याउँछ ।

यसका साथै, यस अवयव अन्तर्गत पुनरुत्थान र जलाधार पुनस्थापना सम्बन्धी गतिविधिहरूका साथै वन क्षेत्र प्रयोग गरेबापतको क्षतिपूर्ति, वन जग्गा मुआब्जा, नर्सरीहरूको स्थापना र वन कार्यालयका पदाधिकारीहरूसँगको सहकार्यमा तोकिएको क्षेत्रमा विरुवा रोप्ने जस्ता कार्यहरूले सुर्खेत उपत्यकाको वन विकास तथा पारिस्थितिकीय प्रभावलाई टेवा दिनेछन् ।

वैकल्पिक विश्लेषण

प्रस्तावित आयोजनाका लागि वैकल्पिक विश्लेषण वातावरणीय र सामाजिक प्रभाव मूल्याङ्कन (ESIA) अध्ययनको महत्वपूर्ण पक्ष रहेको छ । यस विश्लेषणले आयोजनाका प्राविधिक, वातावरणीय र सामाजिक आयामहरूको सन्दर्भमा सम्भाव्यता मूल्याङ्कन गर्न मद्दत गर्दछ । ESIA अध्ययन भित्र, दुई विकल्पहरू राखिएका छन्, जसमा पहिलो विकल्प भेरी र झुप्रा नदीहरूको संगमस्थलदेखि तल्लो तटीय क्षेत्रमा अवस्थित छ । यस विकल्पले निर्माणको क्रममा नदीको डाइभर्सन आवश्यक हुनेछ, जसले निर्माणको समयसीमा विस्तार हुने र लागत बढाउने मात्र नभई झुप्रा नदी मिसिएको कारण पानीको गुणस्तर घटाउँदछ । यसबाहेक, यो विकल्प चाँहि त्यहाँस्थित शव दाहासंस्कार स्थलको नजिक पर्दछ । यसको विपरीत, दोस्रो विकल्प भेरी नदी र झुप्रा नदीको संगमभन्दा माथिल्लो भागमा अवस्थित छ । यो विकल्पले आपूर्तिको लागि सुधारिएको पानीको गुणस्तरमा प्रत्यक्ष रूपमा योगदान पुऱ्याउँछ, र यसले वन जैविक विविधतामा कम क्षति गर्छ, किनभने प्रस्तावित साइट साँघुरो क्षेत्रमा अवस्थित छ । यसबाहेक, यो स्थानमा विकल्प १ को तुलनामा उच्च वहन क्षमता र ठूलो संरचनात्मक सुरक्षा छ । यी सबै पक्षहरूलाई ध्यानमा राख्दै भेरी पम्पिङ उप-आयोजना (प्याकेज-१) का लागि विकल्प २ सिफारिस गरिएको छ ।

लिङ्गमा आधारित हिंसा, यौन शोषण र दुरव्यवहार /यौन उत्पीडन

नेपालमा लिङ्गमा आधारित हिंसा (GBV) प्रचलित वा व्याप्त हुनुका कारण सार्वजनिक र निजी दुवै क्षेत्रमा विशेष गरी ग्रामीण परिवेशमा महिलाहरूप्रति असमान लैङ्गिक सम्बन्ध र भेदभावका कारणले हुने देखिएको छ । यसले महिलाको आर्थिक, सामाजिक, प्रजनन स्वास्थ्य स्थिति र उनीहरूका बालबालिकाको शारीरिक, भावनात्मक र मानसिक स्वास्थ्यमा प्रत्यक्ष प्रभाव पार्छ । उप-आयोजना क्षेत्रमा झुप्रा नदीको किनारमा बादी (दलित) समुदाय रहेको छ। प्रस्तावित निर्माण स्थल भेरी र झुप्रा नदीको संगमबाट करिब ५०० मिटर माथि भेरी नदीको किनारमा रहेको छ । सुर्खेत प्रादेशिक अस्पतालमा रहेको वनस्टप क्राइसिस म्यानेजमेन्ट सेन्टर (OCMC) का अनुसार प्रत्येक महिना औसत ५५ वटा लैङ्गिक हिंसा (GBV) सम्बन्धी केन्द्रमा आउने गरेको छ, जसले घरेलु हिंसा, बलात्कारदेखि बहुविवाह, यौन उत्पीडन बढी रहेको देखाउँछ । गत वर्ष मात्र, ओसीएमसीले १०१४ लैङ्गिक आधारित हिंसा र यौन शोषण र दुरव्यवहार/यौन उत्पीडन (SEA/SH) सम्बन्धित मुद्दाहरू सम्बोधन गरेको थियो । महिला पुनस्थापना केन्द्र (WOREC) ले पनि वीरेन्द्रनगर र वरपरका क्षेत्रहरूमा, विशेष गरी कोभिड महामारी पछिको अवधिमा लैङ्गिक आधारित हिंसा (GBV) मामिलाहरूमा वृद्धि भएको पुष्टि गरेको छ । समुदायहरूमा पहिलेदेखि नै प्रचलित GBV गतिविधिलाई उप- आयोजनाको गतिविधिले थप बढावा गर्न सक्छ, किनभने भेरी नदी इन्टेक र पानी

प्रशोधन प्लान्ट क्षेत्रमा निर्माणको क्रममा प्रतिदिन लगभग १५० देखि २०० कामदारहरू परिचालन हुने अपेक्षा गरिएको छ । तसर्थ यो अध्ययनमा यौन शोषण र दुर्व्यवहार/यौन उत्पीडन (SEA/SH) को सम्भावित जोखिमहरू पर्याप्त रूपमा मूल्याङ्कन गरिएको छ जसका लागि उप- आयोजनाको SEA/SH प्रभावहरूलाई कम गर्नका लागि साइट/स्थान विशेष SEA/SH कार्ययोजना र आचार संहिता अपनाइनेछ ।

निष्कर्ष

यस वातावरणीय र सामाजिक प्रभाव मूल्याङ्कन (ESIA) प्रतिवेदनले भेरी पम्पिङ उप-आयोजना (प्याकेज-१) को भौतिक, जैविक र सामाजिक अवस्थाको बृहत् मूल्याङ्कन प्रस्तुत गरेको छ । ESIA अध्ययनका नतिजाहरूका निष्कर्षहरूले देखाउँछन् कि यस उप-आयोजनाको कार्यान्वयनका क्रममा केहि सीमित नकारात्मक वातावरणीय र सामाजिक प्रभावहरू भए तापनि भेरी पम्पिङ उप-आयोजनाको कार्यान्वयन आयोजना क्षेत्रका बासिन्दाहरूलाई वातावरणीय र सामाजिक-आर्थिक दुवै फाइदाहरू हुनेछन् । यस प्रतिवेदनमा ESMP म्याट्रिक्समा स्पष्ट रूपमा संकेत गरिए अनुसार अन्तर्निहित प्रतिकूल प्रभावहरूलाई न्यूनीकरण गर्न यस रिपोर्टमा विशेष न्यूनीकरण उपायहरू प्रस्ताव गरिएको छ । अनुगमन योजना सहित वातावरणीय र सामाजिक व्यवस्थापन योजना कार्यान्वयन गर्न कुल लागत रु १९०,४५१,९१९.१९ (अमेरिकी डलर लगभग १.४६ मिलियन) बजेट छुट्टाइएको छ ।

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Water Sector Governance and Infrastructure Support Project
Project Management Unit
Panipokhari, Maharajgunj, Kathmandu



Environment and Social Impact Assessment (ESIA) Bheri Pumping Sub-Project (Package-I)

Karnali Province
Birendranagar, Surkhet
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Department of Water Supply and Sewerage Management
Panipokhari, Kathmandu

Abbreviations

°C	Degree Celsius/Centigrade
%	Percentage
BoQ	Bill of Quantities
BES	Brief Environment Study
BOD	Biological Oxygen Demand
COD	Environmental and Social Management Plan
CFUG	Community Forest Users Group
CITES	Convention on International Trade in Endangered Species of Wild.
DFO	Divisional Forest Office
DWSSM	Department of Water Supply and Sewerage Management
DMA	District Metered Area
DO	Dissolved Oxygen
DPR	Detailed Project Report
EIA	Environment Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Act
EPR	Environmental Protection Regulation
ESCP	Environment and Social Commitment Plan
ESMP	Environmental and Social Management Plan
ESSR	Environment and Social Screening Report
ESIA	Environment and Social Impact Assessment
EMR	Environment Management Report
FSTP	Fecal Sludge Treatment Plant
FGD	Focus Group Discussion

GoN	Government of Nepal
GPS	Global Positioning System
HFL	High Flood Level
HH	Household
IDA	International Development Association
IUCN	International Union for Conservation of Nature
IPDP	Indigenous People Development Plan
IPDF	Indigenous People Development Framework
IEE	Initial Environmental Examination
EHS	Environment Health Safety Guideline
IWRM	Integrated Water Resource Management
LAPA	Local Adaptation Plan of Action
LULC	Local Use Land Cover
LMP	Labor Management Plan
KII	Key Informant Interview
km	Kilometer
lps	liter per second
m	meter
m ³	Cubic Meter
mm	millimeter
MoFE	Ministry of Forest and Environment
MoITFE	Ministry of Industry Tourism Forest and Environment
MoPID	Ministry of Physical Infrastructure Development
NAAQS	National Ambient Air Quality Standard
NAPA	National Adaptation Plan of Action

NRW	Non-Revenue Water
NTFP	Non-Timber Forest Product
NTU	Nephelometric Turbidity Unit
NVMES	Nepal Vehicle Mass Emission Standard
PAC	Poly Aluminum Chloride
PAF	Project Affected Families
PIU	Project Implementation Unit
PMU	Project Management Unit
PIR	Policy, Institution, and Regulation
PPSC	Provincial Project Steering Committee
RoW	Right of Way
RSF	Rapid Sand Filter
RVT	Reservoir Tank
SEA	Sexual Exploitation and Abuse
SEMP	Strategic Environment Management Plan
SEP	Stakeholder Engagement Plan
SH	Sesual Harassment
SoP	Standard Operating Procedure
STDs	Sexually Transmitted Diseases
ToR	Terms of Reference
UNFCCC	United Nations Framework Combat for Climate Change
WaSGISP	Water Sector Governance and Infrastructure Project
WASH	Water Sanitation and Hygiene
WSUC	Water Supply Users Committee
WTP	Water Treatment Plan

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Executive Summary

Introduction & Background

The Bheri Pumping Sub-Project is a project under Water Sector Governance and Infrastructure Support Project (WaSGISP) which is a collaboration between GoN and World Bank. The Sub-Project is also referred to as Bheri Pumping Sub-Project Package-I and will be located in Birendranagar and Lekbesi Municipalities of Surkhet of the Karnali Province. The Sub-Project area in Birendranagar Municipality of Bheri Pumping Sub-Project (Package-I) will cover Birendranagar Municipality Ward nos. 1, 2, 3, 4, 6, 8, 9, 10, 11 and 12, and Lekbesi Municipality Ward no 10. This Sub-Project involves major construction work of WaSGISP wherein the construction of a Bheri river intake, water treatment plant, reservoirs, and bulk distribution system are set to take place. The construction of the side Intake will take place in the Bheri River, and of the water treatment plant in the Lekbesi Municipality ward no 10. Meanwhile, the construction of other infrastructures such as the RVT, Pipeline, Transmission line, and Bulk Distribution System will take place in the Birendranagar Municipality ward numbers 1, 2, 3, 4, 6, 8, 9, 10, 11 and 12. With regards to implementation, the sub-project will necessitate collaboration among all levels of government (i.e., federal, provincial, and local) throughout the project's duration.

According to the National Census of 2078 (2021), the total population of the Birendranagar Municipality is 153,863 (Male: 75,129, Female: 78,734) living in 38,377 households, and of the Lekbesi Municipality Ward No. 10 is 3,750 (Male: 1810 and Female: 1940) in 846 households. 70.45 % of the population in Karnali Province have access to basic water supply facilities wherein 76.53 % of the population in Surkhet district have access to these facilities.

Objective of ESIA Study

The major objective of the Environmental and Social Impact Assessment (ESIA) for this Sub-Project is to identify, evaluate, and manage environmental and social risks and impacts in alignment with the Environmental and Social Standards (ESS)s of both GoN and World Bank. Using the mitigation approach, the study aims to help prevent identified risks and impacts, and where avoidance isn't feasible, it aims to minimize or reduce them to an

acceptable standard. If impacts persist, this assessment explores compensation or offsetting options, provided they are technically and financially viable.

Additionally, the objective of the ESIA includes an in-depth analysis of the vulnerable communities, including Indigenous People, to understand their social concerns and associated inclusivity issues, proposing strategies for their integration into the sub-project's design.

Policy, Legal & Administrative Framework

The Environmental and Social Assessment (ESIA) conducted for the Bheri Pumping Sub-Project (Package-I) is in line with the Environmental and Social Framework (ESF) of the World Bank, ESMF of WaSGISP, and the provisions outlined in the Environment Protection Act, 2076 (2019), and Environmental Protection Rules (IPR) 2077 (2020) of the Government of Nepal (GoN). The ESIA study entails a comprehensive examination of the pertinent framework, guidelines, standards, and policies to assess their compatibility with the sub-project's construction activities.

Methodology Adopted

The major activities undertaken during the preparation of ESIA are a) environment and social screening, b) assessment of the possible environmental and social risks and impacts, c) preparation of Environment and Social Management Plan (ESMP), d) preparation of ESIA Report, e) incorporation of the issues from the public consultation, f) submission of ESIA report, g) incorporation of comments and feedback, and h) submission of final ESIA report with required revisions to World Bank and DWSSM for approval. The ESIA conducted for this sub-project has considered the possibility of not only the direct and indirect impacts, but cumulative impacts as well. As part of the impact assessment process, a Rapid Cumulative Impact Assessment (RCIA) was also conducted.

Description of the Existing Environment

Physical Environment

54.28 % of the total area of Birendranagar Municipality is covered by forests followed by agricultural land which covers 22.10 % of the total municipal area. Public service area and

the residential area cover 1.96% and 2.21% of the total area respectively. 1.59% of the municipal area is occupied by the riverine and lake area. Lastly, commercial, cultural, archaeological, and industrial zones collectively occupy 1% of the municipal area.

The sub-project area which is located in the Surkhet district of Karnali Province has fluvio-lacustrine sediments (sand, silt, clay, cobbles, and pebbles) deposited from the northern and southern Siwalik Hills. The sub-project area has an elevation variation ranging from a minimum of 342 m to a maximum of 2252 m, and this region also has a sub-tropical climate. The average maximum temperature fluctuates between 7° C & 23° C and minimum temperature ranges from -7° C to 13° C in the Karnali Province.

The sub-project area falls under the upper Siwalik region which consists of coarse boulder beds and conglomerates with less sandstones, and sandy clays as the binding material. The upper Siwalik region covers about 1.67 % of the Birendranagar municipality and is exposed in the southernmost part of the municipality. As this region comprises of immature and poorly consolidated conglomeratic beds that can be disintegrated easily due to high water content, debris flow is possible. Heavy rainfall is a significant trigger for landslides in Birendranagar Municipality. The pre-existing weathering, high jointing, and fracturing of rocks in the area make it susceptible to landslides and debris flow when exposed to intense rainfall.

As the Birendranagar Municipality is connected to multiple streams such as Itram, Khorke, Neware, Tuni, and Sot Khola, these streams remain dry during the winter but carry monsoonal runoff during the rainy season, leading to floods, soil erosion, and riverbank erosion. The combined flow from rivers and groundwater during the dry season amounts to approximately 8064 m³ / day.

During the ESIA, data for air quality, water quality, and noise levels were taken in the sub-project area. During the assessment, the lowest AQI value and Particulate Matter value were recorded at the intake and Water Treatment Plant Site, amounting to 32 AQI and 21.1 µg/m³, respectively. Moreover, at the Amrit Danda (RVT construction site), the AQI and PM 2.5 value were found to be 37 AQI and 23.6 µg/m³ respectively. In Bangesimal, a location through which the bulk distribution line passes, an AQI of 46 AQI and a PM 2.5 value of 24.1 µg/m³ was observed. Through the water quality test conducted, a total of 12 parameters were analyzed in accordance with the NDWQS 2079 guidelines. The findings of the analysis

indicated an elevated level of turbidity surpassing the permissible limit specified by the NDWQS. Lastly, upon observing the noise levels, it was discovered that the recorded decibel levels were 44 dB for the intake and water treatment plant area, 45 dB for Amrit Dada, and 55 dB for Bangesimal.

Biological Environment

Birendranagar municipality comprises of abundant forest resources and a diverse range of biodiversity. This sub-project requires a total forest area of 3.22 hectares, which is distributed across four community forests: namely Ranichautari, Shiva Shakti, Aishwarya, and Bheri Community forests. As the sub-project is located within the community forests which have scattered human settlements nearby and significant human mobility, this area is not a primary habitat for wildlife. Moreover, as the intake structure to be built will not create a barrier across the river, the aquatic life in the sub-project area is also unaffected. There are no existing plans for the construction of any water structure that could potentially impede aquatic life.

The tree species found in the project area are Sal, Budhgairo, Dhalne Katus, Valaya, Asana, Sallo etc. Small Indian Mongoose, Jungle Cat, Palm Squirrel, House Rat, Golden Jackal, Oliver Keelback Water Snake, Garden Lizard, Himalayan Toad, Snow Trout, and Mahseer are some of the faunal species found in the sub-project area. No endangered, rare, endemic, or threatened species have been found in the sub-project area based on the ESIA field survey.

Socio-economic Environment

The settlement pattern within the project area is diverse. Over the years, the rate of migration into the service area from the nearby villages and other districts has also seen a rise as the municipality is the capital of Karnali Province. According to the 2021 Census, the total population of the Birendranagar Municipality is 153,863 (Male: 75,129, Female: 78,734) in 38,377 HHs, and of the Lekbesi Municipality Ward no. 10 is 3750 (Male: 1810 and Female: 1940 in 1747 HHs). Of the total population, 49% are Male and 51% are Female. As per the National Census of 2021, Brahmin and Chettri groups are the largest ethnicities/castes in the service area covering 61 % of the total population. Majority of the project area

population (91.1 %) follow Hinduism followed by Christianity (3.80 %), Buddhism (3.4 %), Islam (1.5 %), and others (0.2 %). Most of the population in the project area speak Nepali (93 %), followed by Tharu (3.25 %), Maithili (1.66 %), Magar (1.20 %), and others. On average, the literacy rate in the Birendranagar Municipality is 87.2 % of the total population with 92.7 % of the men and 82% of the women being literate. As per a recent study, 28.21 % of the population are involved in service, followed by 19.90 % in agriculture, 17.68 % in business, 17.34 % in wage labor, 4.78 % in foreign employment, 5 % in industry and remaining 7.09 % in other occupation

At present, due to the increase in population and the decreasing trend of water sources, the existing water supply system has struggled to meet the water and sanitation demand adequately. More than 18,000 HHs still lack sufficient access to drinking water. Similarly, only 66.3 % of households have access to basic sanitation facilities.

A Badi settlement is located along the Jhupra River bank, near the vicinity of the Ratna highway and at a distance of approximately 500m from the point where the Jhupra and Bheri rivers meet. The predominant residents in this area belong to the Badi (Dalit) community, with a presence of other Dalit members as well. Additionally, a few households from the other castes/ethnicities also inhabit this settlement. The total number of households in this vicinity numbers to 124, and their main source of income is extraction of riverbed materials from the Jhupra River. The Tharubas village, situated in Lekbesi Municipality, ward number 9, is the closest settlement upstream of the proposed intake area, reachable within a 25-minute walk. With a population of 23 individuals distributed among 6 families, this village accommodates both Thakuri and Janajati (Indigenous Peoples) households. In the vicinity of the sub project area, there also exists a Hindu temple known as Deuti Bajai, which is a national heritage site associated with the Raji community.

Stakeholders Engagement and Public Consultation

During the preparation of this document, the consultation meetings were organized basically for two important objectives: (1) to share sub-project objectives and sub-project interventions with the identified stakeholder groups and (2) to consult with the stakeholders and document their concerns in general and in particular reference to social and environmental impacts of the proposed project interventions. For the preparation of the

ESIA document, the PIU of Birendranagar Municipality took responsibility for coordinating consultative meetings with various stakeholders. In order to inform the relevant stakeholders, public announcements were broadcast through the Bulbule Community Radio and mobile SMS. A comprehensive and inclusive consultation process was undertaken to ensure the involvement and consideration of various stakeholders, particularly IP groups, Dalit groups, and other vulnerable and marginalized communities who may be affected by this sub-project. For this purpose, coordination was also done with Feminist Dalit Organization (FEDO), CFUGs, WASH related organizations, government line agencies and some project affected families. The aim was to conduct meaningful and culturally appropriate consultations to gather their perspectives and address their concern. Mass gatherings were organized to engage a large number of community members, where project details and potential impacts were discussed. Multiple Focus group discussions and in-depth interviews were conducted to gather more specific and detailed feedback from individuals and groups. Additionally, a sub-project GRM has been established to report complaints and/or address disputes throughout the sub-project lifespan. The overall cost allocated for the SEP is NRs. 5,050,000.

Environment and Social Risk and Impact

Environmental and social impacts are crucial aspects of any project or policy, as they encompass the consequences of human activities on the natural world and the communities that inhabit it. Different impacts have been identified during the screening of the sub project. The proposed site for Intake, WTP, RVT, and Transmission line lies within a community forest area and the construction activities will require cutting of 765 trees and 1021 pole in the proposed site. Environmental and Social impacts for this sub-project include potential solid waste management issues from labor campsite, muck disposal, disruption of natural drainage, traffic congestion, occupational health & safety concerns, impact on gender and vulnerable groups, GBV and SEA/SH issues, impact on tangible heritage and cultural property, impact on child and forced labor along with community health & safety concerns, and potential pollution in the ambient air along with water pollution during the construction phase. During the project operation phase, the major possible concerns are impact on water pollution due to sludge removal and its disposal, possibility of noise pollution and vibration in the Intake site, and impact on gender and vulnerable group. Through the ESIA, the

physical, biological and socio-economic impacts of the project proposal have been identified, and an Environmental and Social Management Plan (ESMP) has been prepared for addressing these impacts.

Environmental and Social Management Plan (ESMP) has been prepared with incorporation of; (i) Mitigation measures for the anticipated environmental and social impacts, and (ii) Monitoring plan by the concerned stakeholders for both construction and operation phase. Design options have been worked out to minimize the potential environmental as well as social impacts of the project implementation. Some of the major environmental mitigations proposed are management of the surface drainage in the proposed site, and compensatory plantation at the rate of 10 trees per tree cut. As for the social risks, some of the major social safeguard mitigation measures proposed are consistent consultations regarding GBV and SEA/SH throughout the project duration, capacity building of the locals etc. Details of the mitigation measures proposed for the possible environmental and social impacts and risks have been provisioned in the ESMP matrix of this ESIA report. Moreover, a monitoring plan has also been prepared for timely and regular monitoring of these planned activities. An estimated amount of NRs. **190,451,919.19** (USD 1.46 million, round up figure) has been provisioned for the ESMP activities for this sub-project. This amount will be included in the contract document of the civil works contract of this Bheri Pumping Sub-project.

In addition to adversary impacts, there are many beneficial impacts of this sub-project as well. The major beneficiary impacts that the sub-project is expected to deliver are; improved public health through sustainable water supply and improved sanitation, employment generation in the sub-project area, skill enhancement of the local people, enhancement of local trade & business etc.

Rapid Cumulative Impact Assessment

The primary objective of this Rapid Cumulative Impact Assessment (RCIA) is to identify potential issues that may arise as a result of the Bheri Pumping Sub-project when considered within the context of existing, planned, and reasonably predictable future developments. RCIA for this sub-project involved a collaborative effort including extensive consultations with local experts & government officials, and guidance from experts in CIA.

In February 2023, a rapid screening against potential Key E&S concerns was carried out for

Surkhet Valley Watershed. Following a rapid screening to assess potential cumulative impacts regarding the identified environmental and social concerns, it was determined that water quality and quantity, along with forest and ecology, stand out as the primary E&S concerns (Valued Environmental and Social Components).

Presently, the WaSGISP stands out as the sole confirmed project with secured funding dedicated to supporting WASH activities in the Surkhet Valley for the upcoming 6 to 10 years. While communities express demand for other sectors such as road infrastructure, community irrigation, and urban settlements in the Surkhet Valley, there is currently no confirmed plan with guaranteed financing in place for these endeavors.

At present, two projects are ongoing in Surkhet Valley Watershed area: - Bheri Babai Diversion Multipurpose Project (BBDMP) and Kohalpur- Surkhet 132 KV Transmission Line Project. The combined impact on water quality and quantity stems from the utilization of water resources from the Bheri River source, which are associated with the BBDMP and the Bheri Pumping Sub-project. Following the completion of the BBDMP, Bheri Pumping Sub-project will utilize only 0.009 % and 3.49% of the available discharge from Bheri River during wet and dry season respectively. Withdrawal of this amount of water will cause negligible cumulative impact on water quality and quantity of the Bheri River.

The cumulative impact on the forest and ecology arises from tree cutting and vegetation clearance linked to two projects: the Kohalpur-Surkhet 132 KV Transmission Line Project and the Bheri Pumping Sub Project. These initiatives will require the removal of approximately 3,300 trees and 1,021 poles from four community forests, which represent about 0.3% of the total forested land in these areas. Consequently, if these projects proceed without adequate mitigation measures, there is a possibility of cumulative effects on the forest and ecology of the Surkhet Valley.

The management strategy aimed at addressing the cumulative impacts on the primary environmental and social concerns involves a multifaceted approach. This includes measures within the project's control, those under the purview of WasGISP and PIU, as well as actions by other development partners. A key aspect of this strategy is Component 3 of WaSGISP, which seeks to facilitate low-risk, small to medium-scale investments that mitigate climate-related risks and improve water discharge at supply sources in the

watershed. In addition, reforestation and watershed restoration activities under this component along with the projects mitigations actions for compensatory reforestation, forest land compensation, establishing nurseries, and designated replantation areas in collaboration with forest authorities will aid in reducing the cumulative impact of development on Surkhet Valley's forests and ecology.

Alternative Analysis

Alternative analysis for the proposed project is a crucial aspect of the Environmental and Social Impact Assessment (ESIA) study. This analysis helps evaluate the project's feasibility in terms of its technical, environmental, and social dimensions. Within the ESIA study, two alternatives have been put forth: The first alternative is the one located downstream confluence of the Bheri and Jhupra rivers. This option necessitates the diversion of the river during construction, which not only extends the construction timeline and increases cost but also results in water quality degradation due to the flow of the Jhupra River. Moreover, this alternative is located in close proximity to a cremation site. Conversely, the second alternative is positioned at the upstream confluence of the Bheri River and Jhupra River. This alternative directly contributes to improved water quality for supply, and it features a lower level of forest biodiversity as the proposed site is situated in a degraded area. Furthermore, this location has a higher bearing capacity and greater structural safety compared to alternative 1. Taking all of these factors into account, alternative 2 was recommended for the Bheri pumping sub-project (Package-I).

Gender Based Violence/ Sexual Exploitation and Abuse (SEA)/ Sexual Harassment (SH)

Gender Based Violence (GBV) in Nepal is prevalent due to unequal gender relations and discrimination towards women in both public and private spheres especially in the rural context. It has direct implications on the economic, social, reproductive health status of women, and physical, emotional, and mental health of their children. The sub-project area includes the Badi (Dalits) community on the right bank of the Jhupra River. The proposed construction site is located at around 500 m upward the confluence of the Bheri and Jhupra river. According to the One Stop Crisis Management Center (OCMC) in Surkhet Provincial Hospital, an average of 55 cases per month, related to Gender Based Violence (GBV), come

to the center, indicating a high prevalence of GBV ranging from domestic violence, rape, polygamy, sexual harassment. Last year alone, the OCMC handled 1014 GBV and SEA/SH related cases. WOREC also confirmed an increase in GBV cases in Birendranagar and surrounding areas, especially during/post pandemic period. These already prevalent forms of GBV in communities can be further triggered by the sub-project infrastructure work wherein it is expected that around 150 to 200 laborers will be mobilized per day during the peak construction at the Bheri river intake and water treatment plant area. Therefore, potential risks of SEA/SH have been assessed to be substantial for which a site-specific SEA/SH Action Plan along with a code of conduct will be adopted to mitigate the SEA/SH impacts of the sub-project.

Conclusion

This ESIA report has presented a comprehensive assessment of the physical, biological, and social conditions of the Bheri Pumping Sub-Project (Package-I). Findings from the ESIA study results show that although there will be some limited negative environmental and social implications of this sub-project, the implementation of the Bheri Pumping Sub-Project will also have both environmental and socio-economic benefits to people in the project area. Specific mitigation measures have been proposed in this report to offset the inherent adverse impacts as indicated clearly in the ESMP matrix in this report. The total cost for implementing the Environmental and Social Management Plan including the Monitoring Plan is estimated to be NRs. **190,451,919.19** (USD 1.46 million, round up figure).

CHAPTER 1

Introduction and Background

1.1 Project Proponent

The Department of Water Supply and Sewerage Management (DWSSM) is the proponent of Bheri Pumping Sub-Project Package -I. The project is co-financed by the World Bank and Government of Nepal (GoN). The implementing agency of this project is the Project Management Unit (PMU) of Water Sector Governance and Infrastructure Support Project (WaSGISP) of DWSSM which is under the Ministry of Water Supply (MoWS) of Government of Nepal (GoN). WaSGISP will be implemented through a co-financing model between the Government of Nepal (GoN) (20 million USD) and World Bank (80 million USD).

The full name and the address of the Proponent is as follows:

Project Management Unit (PMU)

Water Sector Governance and Infrastructure Support Project (WaSGISP)

Department of Water Supply and Sewerage Management (DWSSM)

Panipokhari, Kathmandu, Nepal

E-mail : wasgispnepal@gmail.com

Website: www.dwssm.gov.np

1.2 Project Background

Over the past three decades, Nepal has emphasized the integration of environmental and social aspects into its development activities as part of its socio-economic development and environmental management efforts. Various policies and legislations have been implemented to ensure that development programs and projects are environmentally friendly, socially acceptable, and sustainable. In particular, the consideration of environmental and social factors is crucial for the success and sustainability of water supply, sanitation, and hygiene (WASH) projects.

The World Bank has been providing assistance to the Nepalese government since the early 1990s to enhance access to clean drinking water, sanitation, and hygiene in the country.

These efforts have been carried out through projects implemented by the Rural Water Supply and Sanitation Fund Development Board.

Currently, the World Bank and the Ministry of Water Supply (MoWS) are collaborating on the Water Sector Governance and Infrastructure Support Project (WaSGISP). The primary aim of this project is to contribute to the overall development of the water and sanitation sector in Nepal.

WaSGISP will be implemented in six municipalities across the Karnali and Sudurpaschim provinces. This will involve coordination among all three tiers of government throughout the project's duration. The municipalities included in this project are Birendranagar, Dipayal-Silgadhi, Sharada Municipality, Janaki, Joshipur, and Bardagoria Rural Municipalities. WaSGISP aims to demonstrate the effective operationalization of federalism in the water, sanitation, and hygiene (WASH) sector at the local level, with a specific focus on improving water supply and sanitation service delivery in the participating municipalities. Additionally, the project will promote integrated urban and rural water management.

Moreover, according to data from the Department of Water Supply and Sewerage Management (DWSSM), the provinces of Karnali and Sudurpaschim have the lowest rates of basic water supply service coverage, at approximately 84 percent. This disparity can be attributed to the geographical remoteness of these regions. Given their limited access to essential water supply and sanitation services and their remote locations within Nepal, municipalities in these provinces have been included in this project.

The main objective of WaSGISP is to strengthen sector institutional capacity for service delivery under the federal system and increase access to improved water supply and sanitation services in selected municipalities. The project has four core interconnected components:

- Component 1: Strengthening of Sector Governance and Institutional Capacity, and Project Management
- Component 2: Increasing Access to Climate-resilient, Improved and Safe Water Supply and Sanitation (WSS)
- Component 3: Reducing Climate Hazards impacting WSS infrastructure through Integrated Water Resources Management (IWRM) and Watershed Management

Component 4: Contingency Emergency Response (CER) for covering climate-related events and pandemics.

1.3 Project Description

The Bheri Pumping sub-project will be based in the Birendranagar Municipality of Surkhet district in Karnali Province. This sub-project covers construction of a Bheri river intake, water treatment plant, reservoirs, and bulk distribution system. The project location for the first package of WaSGISP (Bheri Pumping Sub-Project) is Birendranagar Municipality, Lekbesi Municipality of Surkhet, Birendranagar Municipality is also the capital city of the Karnali Province.

Karnali is the least populous province in the country with about 16,94,889 people and 371,125 households as of National Census 2021. The coverage of water supply facility is lowest in the Karnali province in comparison to other provinces. About 70.45% of households in Karnali province have access to water supply facilities and coverage of basic sanitation facilities is 100 % in Karnali Province (DWSS, 2018).

In the Karnali province, the project area in Birendranagar Municipality of Bheri Pumping Sub-Project (Package-I) will cover Birendranagar Municipality ward numbers. 1, 2, 3, 4, 6, 8, 9, 10, 11 and 12, and Lakebesi Municipality ward number 10. According to the National Census of 2021, the total population of the Birendranagar Municipality is 153,863 (Male: 75,129, Female: 78,734) in 38,377 households, and of the Lekbesi Municipality ward number 10 is 3,750 (Male: 1,810 and Female: 1,940) in 1,747 households. In addition to the primary urban area within Surkhet Valley, the project will encompass the rural areas surrounding Birendranagar Municipality.

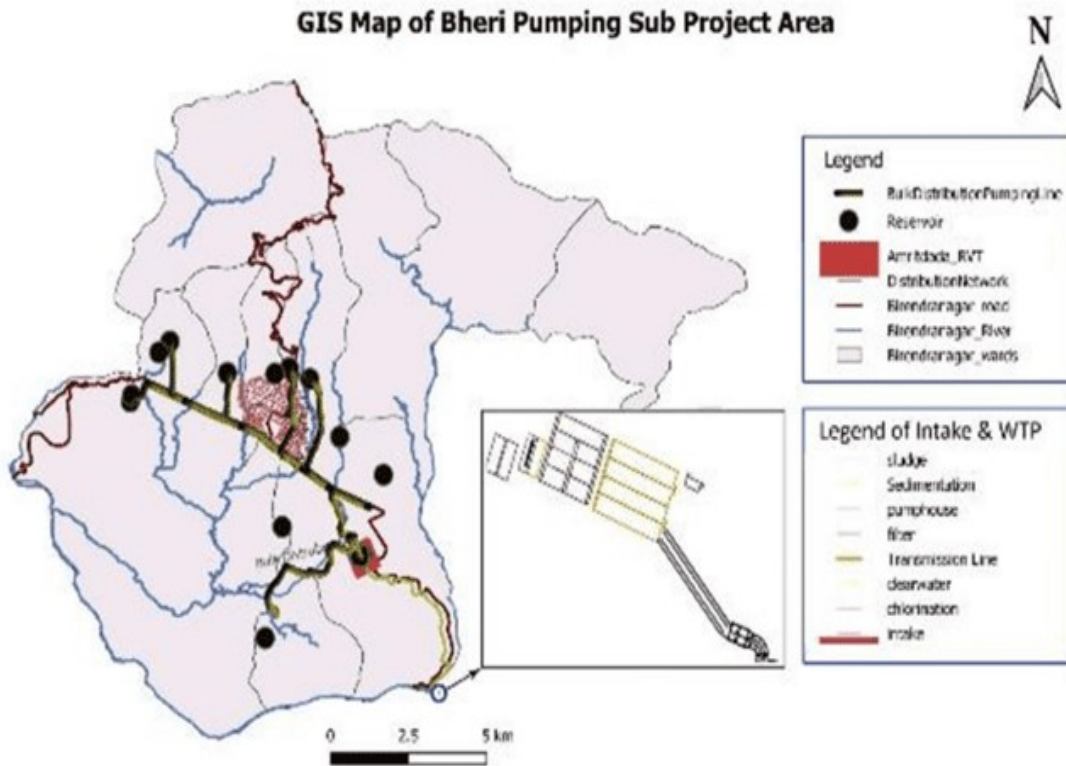


Figure 1-1: GIS Map of the Bheri Pumping Sub-Project

At present, the main source of water in Birendranagar Municipality are the rivers and streams such as- Ittram Khola, Bulbule Khola, Jhupra Khola, and Khorke Khola. The water from these sources has been supplied through the pipeline after filtration (MoUD, 2020). Besides these, water from well, spout, and other sources are used for drinking purpose. The municipality also faces issues like scarcity of water during dry season and high percentage of water leakage through the distribution system. Furthermore, natural disasters such as landslides and flash floods have also caused damage to the pipelines causing disruption of water supply.

As an emerging city of Karnali Province, the average daily demand for drinking water in the Birendranagar Municipality has been projected to increase in near future. Keeping in mind the growing population, the municipality has identified the Bheri River as an alternative source of drinking water. As per the Detail Project Report (DPR), Bheri Pumping Sub-Project will be constructed targeting entire Birendranagar Municipality of Surkhet district. The project area in Birendranagar Municipality is targeted to cover both the core urban and surrounding rural areas of the Municipality.

Description of Project Features

The major components of the Bheri Pumping Sub-Project (Package-I) are Bheri River Intake, Water Treatment Plant, Amrit Danda Reservoir, Pumping Stations, Transmission lines, and Bulk Distribution System. The second package of WaSGISP will incorporate DMAs in the project area. The project description presented here and those described in the salient features are in line with the DPR.



Figure 1-2 Illustration of Site Location of Bheri-Pumping Sub-Project (Package-I)

a) Intake:

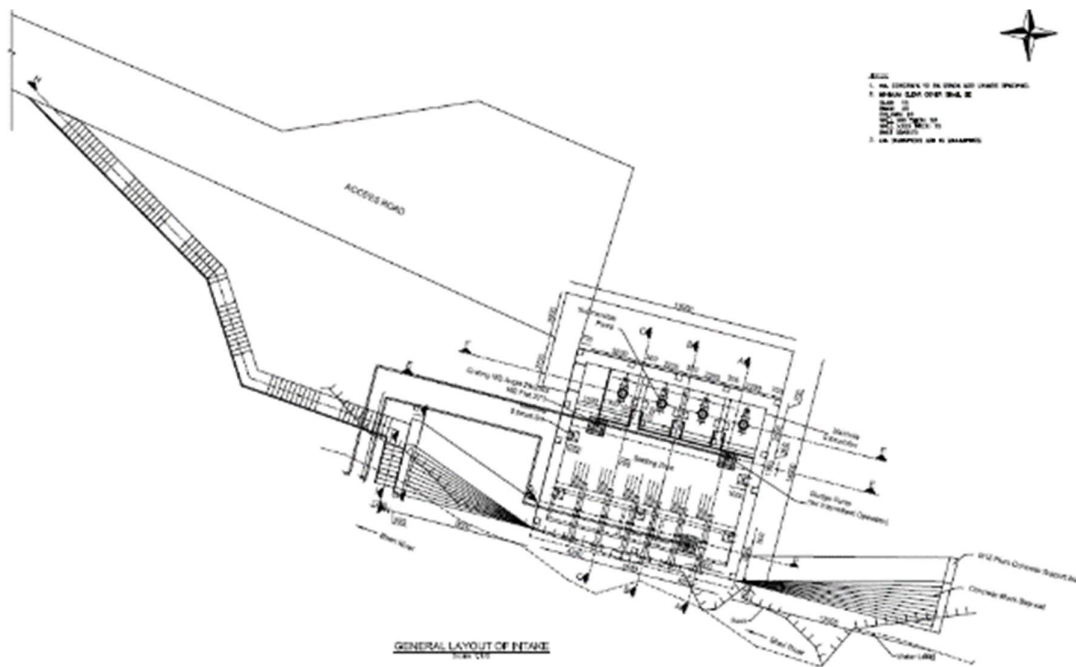


Figure 1-3: Illustration of Intake Site Plan of Bheri-Pumping Sub-Project (Package-I)

AVIYAAN Consulting (P) Ltd. has prepared a detailed project report for the Bheri Pumping Sub-Project which has already been disseminated in the Birendranagar Municipality for finalization. The Bheri river intake site is located at the upstream of Jhupra River and Bheri River. This component is located in Lekbesi municipality, ward number 10.

A single intake will be constructed with multiple intake levels. This design accommodates the river's varying water levels during different seasons. Three level intakes has been proposed to intake water at various seasons with the help of bell mouth pipes. Once collected, the water will be conveyed to a settling zone before being directed to four pumping chambers. Each chamber will be equipped with its own pump, responsible for lifting the water to the treatment plant.

Four number of submersible pumps will be fitted in the intake which upon the water will be lifted to the treatment plant. The operating point of these pumps will be 154 lps at 65m head. The outlet pipe of these pumps will be of 300mm ASTM A106 Grade C Seamless Steel Pipe XS Class with welded joints.

For disposal of sludge, two number of sludge pumps operating at 100 lps at 20m head will be provided. 250mm ASTM A106 Grade C Seamless Steel Pipe XS Class will be provided for de-sludging. Above the intake structure, a truss housing structure will be erected. This enclosure will accommodate all electrical equipment, pumping machinery, operational tools, and plant facilities.

b) Water Treatment Plant

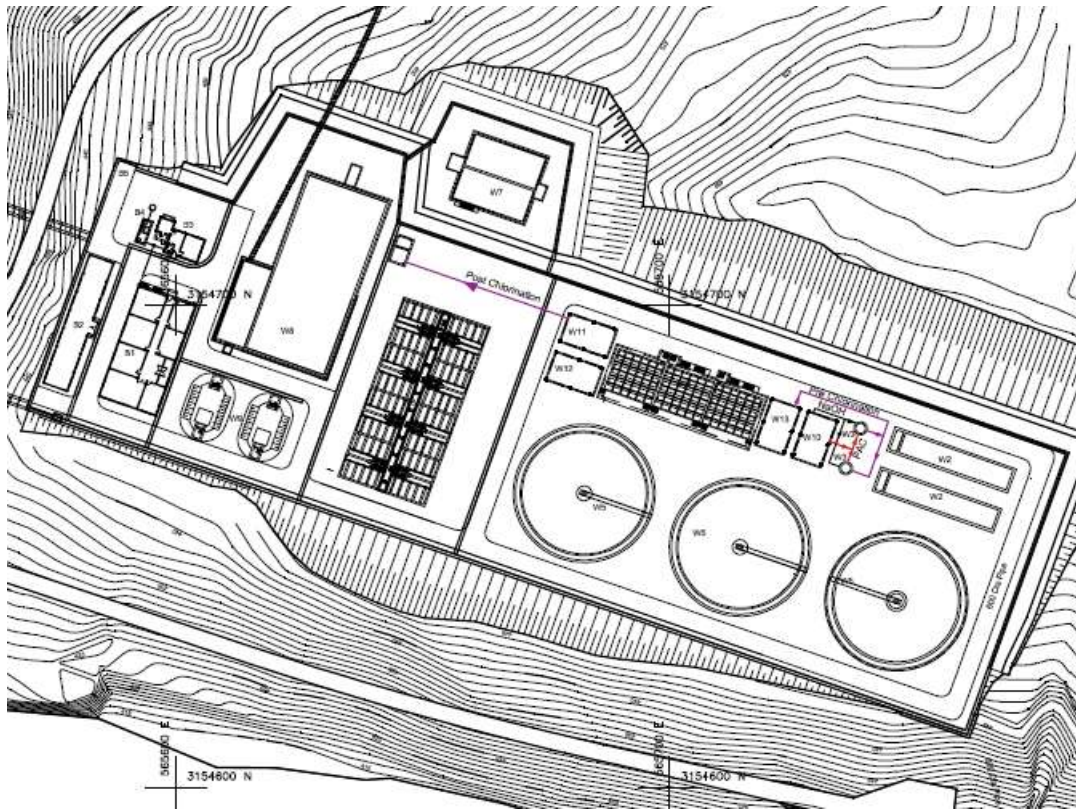


Figure 1-4: Layout of Water Treatment Plant Plan of Bheri-Pumping Sub-Project (Package-I)



Figure 1-5: Layout of Water Treatment Plant Plan of Bheri-Pumping Sub-Project (Package-1) in Google-Earth

The area proposed for the development of the treatment plant is located above the confluence of the Bheri River and Jhupra Khola, opposite to Ratna highway, at a height unaffected by the high flood level (HFL) of both rivers. The treatment plant is located at the community forest at about 30 m above the Bheri river intake site. The HFL was determined during the field survey work by observing and consulting with the people at the survey site. This component is located in Lekbesi Municipality ward no 10. This is a conventional treatment plant for treating water from the Bheri river intake. The treatment process includes grit removal, flocculation and sedimentation followed by rapid sand filtration.

The incoming 600mm pipeline from intake will be first fed into the Pre-Sedimentation Unit. There are two number of Pre-Sedimentation Units. After the Pre-Sedimentation Unit, the water will be conveyed to two number of Rapid Mixing Unit. In Rapid Mixing Unit pre-chlorination and coagulant Poly Aluminum Chloride (PAC) will be chemically dosed. A chemical dosing system will be connected with dosing pumps into rapid mixing unit.

The water will then be conveyed to the three number of Flocculation Basins each comprising of 6 Up and Down flow baffle channels. After flocculation, the water will then be conveyed to three number of circular hooper type Sedimentation Tank. After sedimentation, the water will be conveyed to twelve number of Rapid Sand Filter Units with an air scouring system.

A back wash tank of 760 m³ will also be constructed for the backwashing of two filter bed at a single time. The back wash tank will be provided with a pumping system from the clear water reservoir. Filtered water will then be collected into a 2500 m³ rectangular clear water reservoir. The inlet pipe for the clear water reservoir is 1000mm DI pipe. A Pump house will be connected to the outlet pipes with pump arrangement. There are five outlet pipes and five pumps connected to each 600mm outlet DI pipes.

All the pumps can be operated simultaneously. The outlet of pumps will be connected to a common 600mm steel pipe which forms the pumping mains. The pumping system will be equipped with Pneumatic Surge Tanks to protect against the water surge during operation. Electrical housing and operations will be within the pumping station house and supplied with Variable Frequency Drives, Auto-Power Factor Corrector and Electrical and Water Surge Protection System.

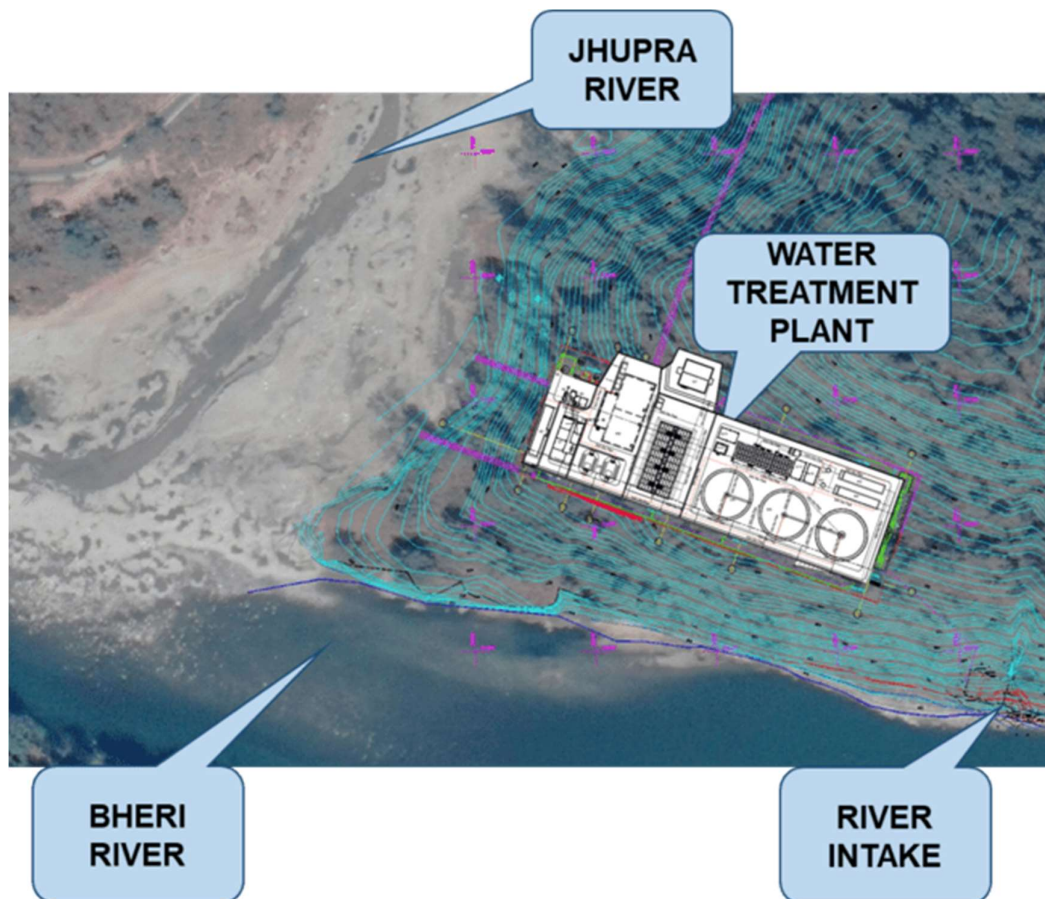


Figure 1-6: Illustration of construction site location of the Water Treatment Plant

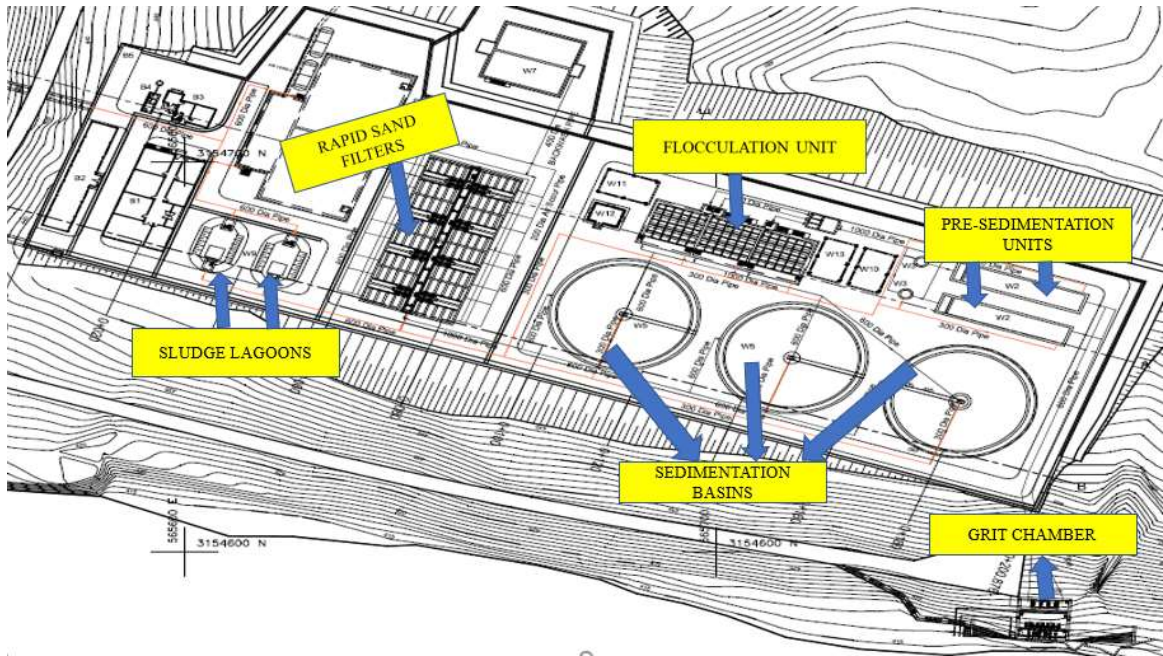


Figure 1-6.1: Illustration of major components of Water Treatment Plant

- Grit Chamber

Horizontal flow grit chamber with two channels has been proposed to separate the heavier inorganic material having specific gravity about 2.65, and pass forward lighter inorganic material towards sedimentation tank for the settlement. The horizontal velocity of flow considered is usually 0.2 m/s with detention time of 60 second. To keep the flow at the desired velocity, mechanical gates have been proposed in the site. Mechanically cleaned screens have been provided in the design, and an adequate pumping arrangement has been designed to pump the settled heavier inorganic material into the sludge lagoon.

- Flocculation and Sedimentation Basin

Flocculation and sedimentation Basins have been proposed prior to rapid sand filter to prevent turbid water from entering into the Rapid Sand Filter units. Raw water from Grit Chamber will pass through the Vertical Hydraulic Baffled Channel Flocculator before entering into the Sedimentation Basin.

- Vertical Hydraulic Baffled Channel Flocculation Basin

Three units of Flocculation basin each comprising of 3 stages with 6 Up and Down Flow Baffle Channel in each stage have been proposed. The velocity gradient has been calculated as 47.66 sec. The internal length and breadth of each flocculation unit is 7.80 m respectively, with the detention time of 23.530 min.

- Sedimentation Basin

Three circular sedimentation basins have been proposed with the capacity of 17740.80 m³/basin and detention time of 2.35 hrs.

- Rapid Sand Filtration Unit

In order to reduce the fine suspended particles and bacteria from the resultant water after sedimentation and flocculation units, 16 Rapid Sand Filter (RSF) Units with 27.2 sqm area for each have been proposed. The RSF has been provided with backwash facilities from an elevation tank and air scouring system. The backwash tank of 760 cum has been proposed which is adequate for backwashing of two filter beds at one time. In the design, the backwash tank has been provided with a pumping system operating for a duration of 20 hours a day from the clear water reservoir.

- Sludge Lagoon

Two sludge lagoons with surface area of 104 m² and volume of 348 m³ have been proposed. Sludge lagoon will be constructed on the treatment plant site for the disposal of the sludge generated from grit chamber, flocculation, sedimentation, and backwash water from filtration unit. The sludge lagoon will be provided with 500- and 300-mm thick sand and clay layer respectively. The sludge from the grit chamber, flocculation and sedimentation basin, and the backwash water from the filtration unit will be passed to the sludge lagoon and retained for some time allowing the settlement of solid particles. The supernatant water from the lagoon will be discharged into Jhupra khola using cascade outlet structure in gravity flow after the effluent meets permissible effluent standards as prescribed by MoFE for discharge into the river. Furthermore, the disposal of the dried sludge will be addressed in the ESMP section of this ESIA report.

c) Bheri Pumping Transmission Line

Bheri pumping transmission line has been modelled using GIS-WSP (an EPANET software operating under ARCGIS) developed by SOFTWEL, Nepal. The proposed transmission line extends from the pump house of the treatment plant to the bulk distribution reservoir at Amrit Danda. Transmission System for Bheri-Pumping Sub-Project (Package-I) comprises of all necessary pipes, fittings and other structures required to convey water from pumping station to the three number of reservoir tanks in Amrit Danda. ASTM A106 Grade C NPS 600mm (24") XS class is the main pipeline with design carrying capacity of 560 lps. The supply line is planned with the right of way of 25m from the center line of Ratna Highway with plans for future highway expansion. The pipes will be laid on the left side of the road that ranges from Amrit Danda to Deuti Bajai, Deuti Bajai to Ratna Highway's Pipira chowk (Deuti bajai chowk), and Pipira Chowk to Bangesimal. Pipes will be mostly laid underground with a minimum cover of 1000mm. For the river crossing, slopes, the pipes will be exposed in the ground and supported with support blocks, anchor blocks and thrust blocks.

The pipe length of the network is 6,875m carrying a flow of 560 l/s. A seamless carbon steel pipe of 12.7 mm thickness has been proposed and a minimum of 1500 mm cover has been considered for the pipe. The transmission line component of this project is located in Lekbesi Municipality Ward no 10 and Birendranagar Municipality Ward No 11.

d) Bulk Distribution Supply Line



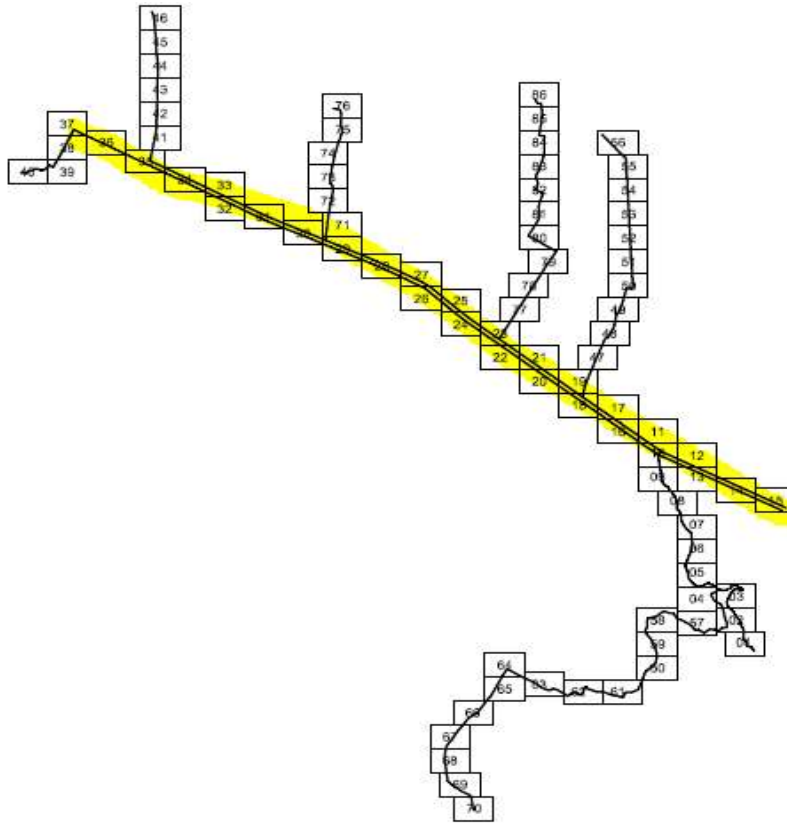


Figure 1-7: Bulk Distribution System in Project Location

The bulk distribution supply line component of the project is located in Birendranagar Municipality ward no 1,2,3,4,6,8,9,10,11 and 13. In the bulk distribution system, a proposed system will serve 24 District Metered Area (DMA) and the pipeline will be laid down along the right of way of the existing road. The total length of the bulk distribution line is 34,694 m. For Package-I, only the pipeline of total length 34.696 km will be laid (highlighted portion in **Figure 1-7**) as part of bulk distribution supply work.

Table 1: Details of Bulk Distribution Supply Line

Pipe Diameter (mm)	Pipe Type	Pipe Length (m)
Bulk Distributions		24391
100	DI	1365
200	DI	2727
250	DI	1396
300	DI	1413
350	DI	1535
400	DI	3498

Pipe Diameter (mm)	Pipe Type	Pipe Length (m)
450	DI	1043
500	DI	3845
600	DI	3391
700	DI	1156
900	DI	3022
Pumping Line		10303
200	DI	5496
250	DI	4807
Grand Total		34694

Ductile Iron pipe of class K9, C30 with Tyton Joint has been proposed as a pipe material for the bulk distribution. The pipe layout will have a minimum cover of 1000 mm. Moreover, the pipes used in this network system will range in size from 100 to 900 mm.

Buildings

The design of the treatment plant area comprises of a guard house, an administrative building, a generator building, and storage building. Both soak pit and septic tank have been provided as part of the design for the disposal of wastewater from the guard house and administrative building.

Access Road

The access road to reach the Intake and Water Treatment Plant (WTP) is through the concrete bridge that is under construction at Bhangari near the Ratna highway. This bridge is nearly 2.3 km upstream of Bheri and Jhupra Confluence. As per the information provided by Federal Road Supervision and Monitoring Office, Surkhet, the construction of the bridge was started in 2018 but the construction process was severely affected by the outbreak of Covid-19. This bridge has been recently completed. The objective of this bridge is to connect the village of Lekbesi Municipality with the Ratna highway. Additionally, in the Lekbesi Municipality section, an earthen road has been built to reach the Simdamar, Rupse village, and Gangate Bazar of Lekbesi Municipality ward number 9 (**Section B of Figure 1-8**). The bridge serves as a connection to the current 5-meter-wide road, which will form a segment of the access road.



Figure 1-8: Maps illustrating the Access Road

At the end of this section B, there is a 900 m long foot trail that needs to be upgraded to an access road (**Section C of Figure 1-8**). The existing foot trail is 1m wide. This foot trail is also used by the communities near Lekbesi Municipality for transportation and collection of Non-Timber Forest Products (NTFPs) from Rani-Chautari Community Forest. After sections C & D, there is a 5m wide existing road (**Section E of Figure 1-8**).

According to the Lakebesi Municipality, they already have a plan to upgrade the foot trail (**Section, C, D, E of Figure 1-8**) to connect the Tharubas village with the main road system. During the course of this study, it was also observed that a certain number of trees will need to be removed in section C. The Tharubas village is at a distance of around 2 km from the Treatment plant/Intake sites. However, as the municipality already has a plan to construct/upgrade the road to an earthen road standard, it is important to ensure that the earthen road is upgraded to the project requirement standards. This will be the responsibility of the Bulk Distribution System contractor of the Bheri Pumping Sub-Project (Package-I).

The project intends to utilize the road as an access road with required upgradation. Upgradation will be done only on the pavement of the carriage way and therefore, this process will not require land acquisition and forest clearances. As per the information

provided by the municipality, the planned construction/upgradation work will be completed by September 15, 2024. This component of the Bheri Pumping Sub-Project (Package-I) is located in Birendranagar Municipality ward no 11 and Lekbesi Municipality ward no 10.

A table with summarized details and salient features of the Bheri Pumping Sub-Project Package-I of the WaSGISP has been provided below.

Table 2: Salient feature of the project

<u>Project Details:</u>	
Project Name:	Bheri Pumping Sub project (Package-I)
District:	Surkhet
Municipality:	Birendranagar Municipality, Lekbesi Municipality Ward no:10
Type of scheme:	River source
Project Location:	Birendranagar Municipality ward no. 1, 2, 3, 4, 6, 8, 9, 10, 11 and 12 and Lekbesi Municipality Ward no: 10.
Design Year	2050
Survey Year Per Capita Demand (lpcd)	112
Pump delivery capacity:	560 l/s <ul style="list-style-type: none"> • No. of Pumps: 5 (no stand-by pumps) • Adopted Power: 550 KW
Intake details:	<ul style="list-style-type: none"> • Side tower intake in Bheri river with 3 levels of operations during low, medium, and high flood with provision of silting chamber and mechanically controlled valves. • Land Area: 400 m² approx.
Pumps at Intake	Installation of submersible pumps in the intake and laying of steel pipelines to lift water from the intake chambers to the treatment plant.
RVT	<ul style="list-style-type: none"> • Total Capacity: 9000 m³ • Amrit Danda • Size of each reservoir: 25m x 25m x 5.2m • Land area requirement: 2800 m² approx. • Land type: Community Forest
Access Road	Total Length: Approximately 900 m from Ratna Highway to construction site of WTP

<u>Project Details:</u>	
Water Treatment Plant	<ul style="list-style-type: none"> • Water treatment plant (WTP) has a total treatment capacity of 53.222 MLD at confluence of Bheri and Jhupra Khola. The major components of the WTP are pre-sedimentation tank, coagulant feeding facility, calcium hydroxide feeding facility, pre and post chlorination, rapid mixing unit, flocculation and sedimentation unit followed by Rapid Sand Filtration. • Total Number of components- six (6) <ol style="list-style-type: none"> 1. Grit Chamber 2. Flocculation and Sedimentation Basin 3. Vertical Hydraulic Baffled Channel Flocculation Basin 4. Sedimentation Basin 5. Rapid Sand Filtration Unit 6. Sludge Lagoon
Transmission (Intake to Amrit Danda)	<ul style="list-style-type: none"> • Length: 6875 m • Pipe diameter: 600 mm • Pipe material: Long steel transmission pipeline system with ASTM A106 grade C pipes, inside mortar lined and outside steel messed concrete guniting • Carrying capacity: 560 l/s
Reservoirs at Amrit Danda	<ul style="list-style-type: none"> • 3 no of 3000 cum rectangular water tank at Amrit Danda with post chlorination facilities. • These water tanks will distribute the pumped water from pumping station to the bulk distribution connecting existing and new reservoirs.
Bulk distribution	<ul style="list-style-type: none"> • Proposed from Amrit Danda reservoir to different wards of Birendranagar Municipality 1,2,3,4,6,8,9,10,11 and 13. • 34.694km bulk distribution system to existing/new reservoirs with ductile iron (DI) pipes from Amrit Danda. <p>The Nominal Pipe Size (NPS) of these DI pipelines vary from 100mm - 900mm.</p>
Construction Period	3 Years
Operation Period	3 years after the successful completion and testing of the entire water supply system
Project Cost	5 Billion NPR (approximately)

1.4 Project Requirement

Land Requirement

As per the finalized DPR, a total of about 5.95 hectares of the land area will be required permanently for the implementation of the project. The detail is presented in Table below.

Table 3: Land requirement for the project

Component	Type of Land Requirement	Community Forest (m ²)	Private Land (m ²)	River Flood Plain (m ²)	Government Land (RoW) (m ²)	Total (m ²)
Intake	Permanent	400	NA	NA		400
WTP		8399.80	NA	NA		8399.80
RVT		2800	NA	NA		2800
Intake	Temporary					
WTP						
RVT						
Pipeline (m ²)	Permanent	20625				20625
Intake to Amritdanda (RVT)	Temporary					
Bulk Distribution System	Permanent				27295.30	27295.30
	Temporary					
Grand Total(m²)						59,520.10 m² (5.95 hectare)

Construction Materials

It has been planned that most of the construction materials for the construction work of Bheri Pumping Sub-Project (Package-I) will be supplied from the nearest local market. Special items, if necessary, will be imported either from India or from industrial countries overseas whichever will be feasible. The approximate detail of the major construction materials to be used during construction work as per the DPR of this Sub-project is listed in the table below.

Table 4: Details of Construction Materials to be Used

S.N.	Construction Material Type	To be supplied from	Quantity required.	Unit
1.	Cement	Nepalgunj	16904	MT
2.	Aggregate	Ranighat	14440	cum
3.	Sand	Confluence of Bheri and Chinchu River	24046	cum
4.	Pipes	Nepalgunj	46.244	km

5.	Reinforcement	Nepalgunj	1642	MT
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1.5 Objectives of ESIA

The Environmental and Social Impact Assessment of this Sub-Project shall achieve the following objectives:

- Establish the existing status of the physical, biological, socio-economic, and cultural environments of the sub-project area;
- Identify, evaluate, and manage the environmental and social risks and impacts of the Project in a manner consistent with the ESS;
- Adopt a mitigation hierarchy approach to anticipate and avoid risks and impacts, where avoidance is not possible to minimize or reduce risks and impacts to acceptable levels, once risks and impacts have been minimized/reduced and mitigated, and where significant residual impacts remain, compensate for or offset them, where technically and financially feasible;
- Carry out an analysis of the vulnerable communities including Indigenous People associated with the project, ascertain their concerns regarding social aspects (including inclusivity), and propose strategies to integrate these concerns into the project's design;
- Carry out consultation to prepare mitigation plans in accordance with the provisions of ESMF, RPF, IPPF, LMP and SEP;
- Introduce the sub-project and provide an opportunity for stakeholders to provide suggestions and identify concerns, feedbacks, and suggestions about the sub-project.
- Develop environmental and social management plan(s) (ESMP) for the subproject that will guide the design and implementation of the project;
- In addition to achieving the above, the ESIA will also identify additional detailed environmental and social activities that need to be carried out by the project to ensure overall project sustainability, and monitor key environmental and social parameters. These also include an assessment of cultural and religious sites in sub-project component sites and identification of labor camp sites;

- Document project conformance with the WB ESF and the Environmental and Social Standards (ESS), and the General Environmental, Health and Safety Guidelines (EHSG);
- Provide clear, comprehensive and practical guidance to the project regarding capacity building initiatives to effectively incorporate environmental and social risk management measures during project implementation.

CHAPTER 2

Review of Plan/ Policies, Legislations, Guidelines, Standards, and Conventions

2.1 Introduction

The purpose of reviewing national laws in the Environmental Social Impact Assessment (ESIA) is to ensure their alignment with the latest international standards and best practices in environmental protection. ESIA is a systematic process that assesses the potential environmental and social impacts of proposed projects or activities and provides recommendations to mitigate or minimize these impacts.

This chapter reviews and analyses the legal and institutional framework (i.e., policies and measures) for the ESIA for their relevance in mitigating potential negative environmental and social impact.

Table 5: Relevant Act, Rules, Plan, Policies, and Guidelines

Act, Rule, Policy, Guideline	Year	Relevant Provisions
The Constitution		
Constitution of Nepal	2015 (2072)	<p>The Constitution of Nepal, released in 2015, has defined the work in terms of water and natural environment related areas so that every citizen has the right to a clean and healthy environment.</p> <p>It established the right to a clean environment. According to Article 30 of the Constitution, every citizen has the right to live in a clean and healthy environment. Similarly, in Article 35 of the Constitution, it is stated that every citizen has the right to receive basic health services free of charge, every citizen has equal access to health services, and every person has the right to receive information about his treatment.</p> <p>Therefore, after the completion of this project, the mentioned constitutional provisions will be guaranteed.</p>
Plans, Policies and Strategies		
The 15th Plan of Nepal	(FY 2076/77-2080/81)	<p>The 15th Plan of Nepal focus on ensuring clean and accessible water for all citizens. Some of the key initiatives include:</p> <p>Plan prioritizes infrastructure improvements for safe drinking water availability through construction and maintenance.</p>

Act, Rule, Policy, Guideline	Year	Relevant Provisions
		<p>Regular monitoring and testing of water sources ensure national standards, addressing contamination and implementing proper treatment methods.</p> <p>Plan focuses on equitable distribution of drinking water, reducing disparities, and providing infrastructure for marginalized communities.</p> <p>Plan promotes sustainable water management practices for long-term resource conservation.</p> <p>The plan emphasizes public awareness and education on safe drinking water and hygiene practices, with campaigns and awareness programs promoting responsible water usage and sanitation.</p>
Nepal Biodiversity strategy and Action Plan	2071-2077 BS (2014-2020 A.D.)	<p>The following elements for the development of the water supply sector have received focus in this action plan:</p> <p>The plan emphasizes integrated water resource management, safe drinking water access, and sanitation infrastructure development, focusing on rural and underserved regions. It emphasizes the importance of proper treatment technology and waste management for pollution prevention and biodiversity protection.</p> <p>The policy prioritizes water ecosystem conservation, defending biodiversity, and adapting to climate change. It emphasizes resistance and preserving water resources. Community involvement is promoted through community-based projects, enabling local communities to control water supplies and sanitary infrastructure.</p>

Act, Rule, Policy, Guideline	Year	Relevant Provisions
The Nepal Health Sector Emergency Response Plan	2020 (2077)	The Nepal Health Sector Emergency Response Plan (2020) is a strategy to address health emergencies in Nepal, enhancing preparedness, response, and recovery capacity. It strengthens coordination among stakeholders, including government agencies, health organizations, and international organizations, ensuring rapid and effective response. It emphasizes early detection, rapid response, and essential health services for affected communities. It also emphasizes community involvement in public awareness campaigns and emergency response activities, ensuring effective and tailored responses to meet the specific needs of the affected population.
Water Resources Policy	2020 (2077 B.S.)	The policy focuses on sustainable water resource management, ensuring economic prosperity and social transformation. It aims to meet multi-sectoral demands, increase productivity, meet citizens' needs, minimize environmental impact, and reduce water-induced disasters.
The National Forest Policy	2015 (2075 B.S.)	The National Forest Policy 2015 aims to increase forest production, value, and equitable distribution through sustainable, participatory management of forests, protected areas, water bodies, biological diversity, wildlife, and vegetation. It guides laws, plans, and programs in the forest sector, considering federal, provincial, and local rights.
National Wetland Policy	2013 (2059 B.S.)	Wetland Policy 2013 aims to protect and promote wetlands in Nepal. The policy aims to prevent exploitation, species expansion, and unorganized human activities, promoting conservation and wise use of wetlands.

Act, Rule, Policy, Guideline	Year	Relevant Provisions
Climate Change Policy	2019 (2076 B.S.)	The policy aims to improve climate change mitigation and adaptation in government policies and programs, focusing on climate-friendly technology, sustainable infrastructure, and a healthy living environment. It emphasizes water-efficient technology, waste management, and the use of biodegradable waste.
National Environmental Policy	2076 B.S. (2019 A.D.)	The policy promotes pollution control, waste management, and greenery to ensure citizens' rights to a fair and healthy environment. It guides environmental laws, international commitments, and collaboration between government agencies and non-government organizations.
National Occupational Safety and Health Policy	2019 (2076 B.S.)	The policy aims to create a safe and healthy workplace by institutionalizing occupational health and safety as a work culture. It aims to increase productivity, improve safety systems, minimize injuries, and classify labor activities. It also develops standards, indicators, and safety systems.
The Land Acquisition, Resettlement, and Rehabilitation Policy of Nepal	2015 (2071 B.S.)	The Land Acquisition, Resettlement, and Rehabilitation Policy aims to provide fair compensation to individuals and communities affected by land acquisition for development projects. Key aspects include compensation, resettlement and rehabilitation, consultation and participation, and grievance redressal. Compensation includes the value of land, structures, trees, and crops, while resettlement and rehabilitation involve providing alternative land, housing, infrastructure, and basic services. The policy encourages public consultations and social impact assessments to ensure affected individuals have a say in decision-making processes.

Act, Rule, Policy, Guideline	Year	Relevant Provisions
National Water Supply and Sanitation Sector Policy	2014 (2071 B.S.)	The policy aims to reduce urban and rural poverty by promoting equitable socio-economic development, improving health, and protecting the environment through sustainable water supply and sanitation services. It focuses on providing safe, reliable, and enhanced services at affordable prices, achieving sustainable objectives through infrastructure, institutional setup, cost recovery, financing, user participation, and partnerships with the private sector. Strategic programs should focus on basic service coverage, upgradation, users' involvement, accessibility, drinking water source protection, environmental compliance, and cost-effective technologies.
The Natural Conservation National Strategic Framework for Sustainable Development	(2015-2030)	The Natural Conservation National Strategic Framework for Sustainable Development (2015-2030) in Nepal is a comprehensive plan that aims to conserve and sustainably manage the country's natural resources. It focuses on promoting sustainable development practices and safeguarding the environment for future generations. This framework encompasses various key areas such as biodiversity conservation, climate change adaptation, disaster risk reduction, and sustainable tourism. Through strategic interventions, the framework seeks to achieve a balance between development and environmental protection, ensuring the long-term well-being of both people and nature in Nepal.
The Water Resource Strategy	2002 (2058 B.S.)	The Strategy aims to promote sustainable and responsible water resource management by balancing usage across sectors and considering environmental conservation. It emphasizes integrated management, ecosystem protection, and efficient use through conservation measures, technological advancements, and public awareness campaigns. Regular monitoring and assessment are crucial for ensuring sustainability.

Act, Rule, Policy, Guideline	Year	Relevant Provisions
The Gender Equality and Social Inclusion Strategy	2009 (2067 B.S.)	The Strategy aims to promote gender equality and social inclusion in the country, addressing socio-economic disparities and discrimination faced by marginalized groups. It aims to eliminate discrimination through policy reforms, institutional mechanisms, and targeted interventions. It empowers marginalized groups and promotes active participation in decision-making processes. Addressing structural inequalities and societal norms is crucial, and collaboration among sectors is essential for sustainable change.
The Rural Water Supply and Sanitation Sector Strategy	2004	This Strategy aimed to ensure access to clean and safe water supply and sanitation facilities in rural areas. It focused on promoting sustainable practices and empowering local communities. The strategy emphasized the importance of community participation, capacity building, and utilizing appropriate technologies. Its goal was to improve the overall health and well-being of rural communities by providing them with reliable and efficient water supply and sanitation services.
Acts		
Good Governance (Management and Operation) Act	2008 (2064 B.S.)	The Act aims to create a transparent, accountable, and efficient governance system in Nepal, fostering trust and confidence among the public. It focuses on transparency in public institutions, appointment, promotion, evaluation, financial management, procurement, and decision-making processes. It also promotes citizen engagement and sets standards for ethical conduct and anti-corruption measures, promoting integrity and accountability at all levels of public administration.

Act, Rule, Policy, Guideline	Year	Relevant Provisions
Sexual Harassment at Workplace (Prevention) Act	2015 (2071 B.S.)	This Act aims to prevent and address sexual harassment in the workplace. It prohibits acts such as touching, using obscene language, teasing, or harassing someone with sexual intent. If found guilty, the perpetrator may face imprisonment or fines up to 25,000 rupees, while false complaints can result in fines up to ten thousand rupees. Complaints can be heard within 15 days, and if not satisfied, the complainant can appeal to the district court.
Environmental Protection Act	2019 (2076 B.S.)	The Act requires project proposals to conduct environmental studies, with capacity, output, or investment determining whether EIA, IEE, or BES are required. Approval is required for any studies.
Drinking Water and Sanitation Act	2022 (2079 B.S.)	The Nepal Constitution grants citizens the right to safe drinking water and sanitation, which is protected by this Act and prevailing laws. Union, state, and local governments are responsible for water supply, sanitation, and project prepermitting construction, operation, and management. The Bheri Pumping Project will be constructed in accordance with the Act's provisions, ensuring citizens' rights are respected and protected.
Forest Act	2019 (2076 B.S.)	The Act focuses on considering forest values, environmental services, and biodiversity, rather than just timber production. It is resource-oriented, allowing the government to use national forest areas for priority projects without significant environmental impact. Section 41 prohibits changing land use for forest areas, but this does not apply to infrastructure projects. Section 42 permits the government to use forest areas for development projects if no other alternative is available. If no alternative is found, the government may request land acquisition for the project.

Act, Rule, Policy, Guideline	Year	Relevant Provisions
Social Security Act and Regulation	2018 (2075)	The Act provides social protection and support to vulnerable citizens, focusing on retirement, disability, and healthcare coverage. It establishes a comprehensive social security system, promoting social inclusion and reducing poverty. The Act outlines eligibility criteria and procedures for accessing benefits, including old-age pensions, survivor benefits, and disability benefits. It also addresses healthcare coverage, ensuring accessible and affordable services for all citizens.
The Land Acquisition Act	1977 (2034 B.S.)	This Act is a key legislation applicable to the acquisition of land and other physical assets in Nepal. It enables the Government to acquire land for public purposes and provides for fair and just compensation to private landowners. If necessary, the Government of Nepal can acquire any amount of land from any place by giving compensation.
Local Government Operation Act	2017 (2074 B.S.)	The Act aims to institutionalize legislative, executive, and quasi-judicial practices in newly formed local governments. It outlines authorities, duties, and responsibilities, as well as administrative structures and district assembly. It clarifies municipalities' rights to form local laws, regulations, and criteria for environmental protection, pollution control, and solid waste management. Cooperation is crucial for water treatment and sanitation projects.
Endangered Species of Wild Fauna and Flora	2017 (2072 B.S.)	This Act has been drafted for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, 1973, to which Nepal is a party, for the protection of various species of endangered wildlife and flora and for the necessary measures to regulate and control their international trade. This Act prohibits the trade or business of rare and endangered wildlife or species or their specimens. This Act also

Act, Rule, Policy, Guideline	Year	Relevant Provisions
International Trade Control Act		emphasized that the endangered species should be protected. The implementation of this Act will help to implement the risk that may occur to endangered wildlife or plant species due to the development activities that will be constructed using the forest area.
Labor Act	2017 (2074 B.S.)	<p>The Act is a key document governing the regulatory framework for labor in Nepal and ensures nondiscrimination in employment and remuneration. It bars employers from employing workers without a contract and incorporates provisions for public holidays, annual leave, and maternity and paternity leave.</p> <p>It provides for the control and regulation of safe drinking water and quality of food, air and noise pollution, and environmental pollution and risk control.</p> <p>It is important to collaborate with relevant municipal departments in designing, developing, and implementing water treatment and sanitation projects.</p>
Child Labor (Prohibition and Regulation) Act	2000 (2056 B.S.)	<p>This Act defines a child as one who has not reached the age of 14 and bans employing them to work as a laborer. However, it allows limited use of persons between 14-18 as workers but prohibits working in a hazardous work environment. Enterprises must obtain approval for employing workers aged 14-18, and child workers are not allowed to work for more than 6 hours per day and 30 hours of work per week. They are also entitled to a one-day leave every week and a labor officer to inspect an enterprise engaging children.</p>

Act, Rule, Policy, Guideline	Year	Relevant Provisions
Aquatic Life Protection Act	1999 (2055 B.S.)	The Aquatic Animal Protection Act in Nepal aims to protect aquatic animals, safeguard marine and freshwater ecosystems, and protect species. It prevents illegal trade, capture, and exploitation, promotes sustainable fisheries and aquaculture practices, and establishes regulations for responsible management. The Act promotes public awareness and encourages active participation in preserving Nepal's aquatic biodiversity.
Water Resource Act	1992 (2049 B.S.)	The Nepal Act regulates water resource utilization, development, and conservation, granting the government authority to control and manage water resources. It requires permits for water use, outlines requirements for projects like dams, hydropower plants, irrigation systems, and water supply systems, and establishes the Water Resource Management Board for policy formulation and efficient use.
Soil & Watershed Conservation Act	1982 (2039 B.S.)	The Act promotes sustainable use and management of soil and water resources for future generations, recognizing their importance in agriculture, environmental preservation, and ecosystem health. It establishes measures to prevent erosion, promote soil health, protect water quality, and manage resources efficiently. It encourages collaboration between government agencies, landowners, and stakeholders to implement effective conservation practices.
National Park and Wildlife Conservation Act	1973 (2029 B.S.) (with latest amendment)	The Nepal Act aims to conserve national parks, wildlife reserves, and wildlife species, preserving Nepal's unique biodiversity. It has undergone amendments since 2015, focusing on wildlife conservation, promoting scientific research, and ensuring sustainable use of natural resources. The act prohibits activities that harm wildlife, such as hunting, poaching, illegal trade, and habitat destruction. The National Parks and Wildlife Conservation

Act, Rule, Policy, Guideline	Year	Relevant Provisions
	s in 2015 (2072 B.S.)	Department is established for enforcement. Amendments in 2015 strengthened the act by incorporating community participation, sustainable tourism, and enhancing penalties for wildlife-related crimes.
National Foundation for Development of Indigenous Nationalities Act	2002 (2056 B.S.)	The National Foundation for Development of Indigenous Nationalities Act in Nepal aims to protect and preserve the rights and welfare of indigenous nationalities. It addresses historical injustices and discrimination, focusing on education, health, livelihoods, social justice, and cultural preservation. The foundation empowers indigenous communities, promotes participation in decision-making processes, and ensures their inclusion in Nepal's development.
Good Governance (Management and Operation) Act	2007 (2064 B.S.)	The act includes a provision for engaging stakeholders and civil society in public affairs. This entails evaluating both positive and negative aspects of proposed subjects and assessing their potential impacts. The term "subject of public interest" encompasses also significant developmental programs or projects. In essence, Nepal's legal framework places importance on involving stakeholders and revealing information related to matters of public significance.
Rules & Regulations		
Environment Protection Rules	2020 (2077 B.S.)	Environmental Protection Rules aim to protect and preserve the environment, addressing issues like air pollution, water resources management, biodiversity conservation, and climate change mitigation. Key provisions include proper waste management, stricter emissions standards, clean energy sources, and vehicle emissions regulation.

Act, Rule, Policy, Guideline	Year	Relevant Provisions
Solid Waste Management Regulation	2013 (2070 B.S.)	The Solid Waste Management Regulation Nepal is a set of guidelines formulated to manage and address the challenges related to solid waste management in the country. It aims to ensure the proper collection, transportation, disposal, and recycling of solid waste, promoting a cleaner and healthier environment. The regulation places emphasis on waste segregation, composting, and recycling practices to minimize the overall waste generated and promote sustainable waste management practices.
National Park and Wildlife Conservation Regulation	With latest amendments in 2013 (2070)	The National Park and Wildlife Conservation Regulation 2030 is a legislation that focuses on the protection and preservation of national parks and wildlife in a structured manner. It sets forth guidelines and rules for the management and conservation of these natural resources
Forest Regulation	2022 (2079 B.S.)	Forest Regulation 2022 is an important rule that governs the management and conservation of forests. It covers various aspects such as sustainable forest management, timber harvesting, protection of wildlife and biodiversity, and the prevention of illegal logging. The regulation aims to ensure that forests are managed responsibly to maintain their ecological balance and provide multiple benefits to society.
Water Resources Regulation	1993 (2050 B.S.)	This rule focuses on the management and regulation of water resources in the country. It covers various aspects such as water use, allocation, conservation, and pollution control. The regulations aim to ensure sustainable and efficient use of water resources, prevent water scarcity, protect the environment, and promote equitable water distribution.

Act, Rule, Policy, Guideline	Year	Relevant Provisions
Labor Rules	2018 (2075 B.S.)	The Labor Rule outlines standard working hours (8 hours per day and 48 hours per week), overtime compensation (1.5 times regular wage), annual leave entitlement (14-30 days per year), maternity leave (52 weeks), social security contributions, and termination of employment with varying notice periods. It also covers maternity leave, social security, and termination of employment.
Child Labor (Prohibition and Regulation) Rules,	2006 (2006 B.S.)	The Child Labor Regulations prohibit the employment of children under 14 in hazardous and non-hazardous work. They categorize hazardous occupations, such as mining, construction, and hazardous factories, and allow children between 14 and 16 to engage in non-hazardous work under certain conditions. Employers must ensure safety, health, and welfare through adequate training, protective gear, and safe working conditions. Education is also emphasized, and employers must maintain a register of children engaged in work, outlining their age, working hours, and nature of work. Government authorities may conduct inspections to ensure compliance.
Guidelines / manuals/ Directives		
राष्ट्रिय प्राथमिकता प्राप्त योजनाको लागि राष्ट्रिय वन क्षेत्र प्रयोग गर्ने सम्बन्धी कार्यविधि (Procedure related to using national	2019 (2076 B.S.)	This procedure has set various provisions to prevent the destruction of forest areas due to development and construction work. According to which, while studying the feasibility of any development work, it has been arranged that it should be done without affecting the national forest area as much as possible. In relation to the impact on the environment during the implementation of the project, there is a provision that an IEE or EIA should be carried out in accordance with the prevailing laws related to the environment. According to this, during the

Act, Rule, Policy, Guideline	Year	Relevant Provisions
forest area for national priority plan)		feasibility study, the relevant ministry will have to prepare a report with an environmental management plan containing the necessary measures to reduce the damage.
Community Forest Inventory guidelines	2005 (2062 B.S)	This guideline aimed to standardize forest inventories, involve local communities, and ensure accurate data collection for informed decision-making. It emphasized participatory approach, systematic methods, mapping, capacity building, and collaboration.
Community Forest Guideline	2001 (2058 B.S.)	This Guideline has promoted community-based forest management, granting local communities rights and responsibilities for managing designated forest areas. They encourage active participation, promoting sustainable practices, and enhancing biodiversity conservation, deforestation reduction, and livelihood improvements. These guidelines have significantly impacted the well-being of communities and contributed to the conservation of biodiversity and sustainable forest management practices in Nepal.
Forest Products, Collection, Sale and Distribution Guidelines	2020 (2077 B.S.)	The Guideline is a comprehensive resource for Nepal's forestry sector, focusing on collection, sales, and distribution of forest produce. It includes a database of timber, NTFPs, medicinal plants, and collection practices. This resource aids businesses, researchers, and policymakers in understanding market dynamics, promoting informed decision-making and sustainable resource management.

Act, Rule, Policy, Guideline	Year	Relevant Provisions
Guidelines on Environmental Management Plan	1997 (2053 B.S.)	The plan emphasizes the need to prepare Environmental Management Plans (EMPs) to recommend strategies and measures to minimize environmental impacts from projects or activities.
Working Procedure/ Work Plan		
Working Procedure for the Use of National Forest Area for National Priority Project	2017 (2074 B.S.)	The National Priority Project, 2017 in Nepal aims to effectively utilize the national forest area by following a step-by-step process. This includes identifying the forest area, evaluating its environmental impact, biodiversity, and sustainability, developing a detailed project plan, consulting with local communities, stakeholders, and government agencies, obtaining environmental clearance, developing a comprehensive resource management plan, monitoring and evaluating progress, enhancing local community and project staff knowledge, raising public awareness, and maintaining proper documentation of project activities. By following these steps, the project aims to promote environmental preservation and sustainable development in Nepal's national forest area.
Standard		
National Ambient Air Quality Standard	2012 (2069 B.S.)	National Ambient Air Quality Standards (NAAQS) are guidelines set by governments to regulate outdoor air pollution levels, protecting public health and the environment. These standards typically specify limits for particulate matter (PM), sulfur dioxide (SO ₂), nitrogen dioxide (NO ₂), carbon monoxide (CO), ozone (O ₃), and lead (Pb), based on scientific research and health considerations.

Act, Rule, Policy, Guideline	Year	Relevant Provisions
National Drinking Water Quality Standard, Implementation Guideline, 2062	2006 (2062 B.S.)	This guideline has specified various standards of drinking water quality. According to which microbiological parameters evaluate harmful microorganisms in drinking water, set limits to prevent diseases. Physical and chemical parameters including color, turbidity, pH, temperature, and contaminants determine water safety. Radiological parameters evaluate radioactive materials and maintain safe levels. Organoleptic parameters evaluate the sensory characteristics of water, ensuring acceptable properties for consumption.
Waste Water (Standards for Discharge of Industrial Effluent into a Waste Water System) Regulations	2004 (2060 B.S.)	The Regulations regulate the discharge of industrial effluent into the waste water system, aiming to protect the environment and ensure proper treatment and management. They specify permissible limits for pollutants like pH, BOD, COD, and TSS, ensuring water resource quality and pollution prevention. Industries in Nepal must comply with these standards, implement treatment measures, and monitor effluent quality regularly. These regulations contribute to responsible waste water management and community well-being.
International Instrument		
The United Nations Declaration on the Rights of	2007	UNDRIP is a declaration that acknowledges the rights of indigenous peoples to self-determination, land and resources, cultural heritage, non-discrimination, free, prior, and informed consent, participation and consultation, and remedies and redress. It emphasizes the importance of preserving and promoting indigenous traditions, promoting non-discrimination, and ensuring equal enjoyment of human rights. The declaration also emphasizes

Act, Rule, Policy, Guideline	Year	Relevant Provisions
Indigenous Peoples, UNDRIP		the need for effective remedies and fair procedures for resolving disputes. Although not legally binding, UNDRIP holds significant moral and political weight and has been influential in shaping national and international policies concerning indigenous peoples' rights
International Labor Organization Convention	1998	The ILO Convention of 1998, adopted by the General Conference of the ILO, aims to eliminate the worst forms of child labor by providing a framework for action. It defines the worst forms of child labor, including slavery, forced labor, child trafficking, armed conflict, hazardous work, and work that interferes with children's education. The convention sets a minimum age for employment or work that could be harmful to children's health, safety, or morals at 18 years, with exceptions for light work from 16 years old. It emphasizes immediate action, education and rehabilitation, cooperation and assistance, and ratification and implementation. The convention has been ratified by numerous countries, raising awareness and mobilizing action to protect children's rights and ensure their well-being.
Convention on Biological Diversity (CBD)	1992	The Convention on Biological Diversity (CBD) is an international treaty aiming to conserve biodiversity, promote sustainable use of biological resources, and ensure fair and equitable sharing of benefits arising from genetic resource utilization. It emphasizes the importance of maintaining natural balance, safeguarding species and habitats, and promoting responsible utilization of natural resources for human well-being.
Concerning Indigenous and	1991	This Convention is adopted by the ILO to protect and recognize the rights of indigenous and tribal peoples in independent countries. It promotes self-determination, cultural integrity, land rights, and fundamental human

Act, Rule, Policy, Guideline	Year	Relevant Provisions
Tribal Peoples in Independent Countries, 1991 Convention (No.169)		rights. The Convention covers issues like land rights, participation in decision-making, social and economic development, education, health, and cultural heritage preservation. It requires governments to consult and cooperate with indigenous and tribal peoples, adopt special measures to protect their rights, and promote their right to determine their development priorities and strategies.
World Heritage Convention	1975	The World Heritage Convention, adopted by UNESCO in 1972, aims to identify, protect, and preserve universally valuable sites. It includes cultural, natural, and mixed sites, with criteria like masterpieces, exceptional natural phenomena, or biodiversity. The Convention emphasizes long-term preservation, international cooperation, and public awareness.
World Heritage Advice Note: Environmental Assessment (18 Nov 2013): A step-by-step guidance on environmental	18 Nov 2013	This Assessment offers step-by-step guidance on conducting environmental assessments for World Heritage properties. It aims to assess and manage potential impacts of proposed projects or activities to safeguard their Outstanding Universal Value (OUV). Key steps include defining the scope and objectives, conducting a baseline assessment, assessing the potential impacts, developing mitigation measures, establishing a monitoring and management framework, engaging with stakeholders, reporting and documenting the process, and considering the environmental assessment report in decision-making. The guidance is not binding but serves as a reference for states parties, site managers, and other stakeholders involved in managing World Heritage properties.

Act, Rule, Policy, Guideline	Year	Relevant Provisions
assessment for world heritage properties		
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	1973 amended on 1979	CITES is an international agreement established in 1973 to regulate and monitor the international trade of endangered species of wild animals and plants. It aims for sustainable wildlife trade and protects endangered species through permits and certificates. With 183 member countries, CITES classifies species into three appendices based on protection level: threatened with extinction, non-threatening but requiring control, and protected in at least one country. The treaty encourages cooperation, scientific research, and technical assistance for effective implementation. Overall, CITES plays a crucial role in combating illegal wildlife trade and protecting endangered species through international cooperation and sustainable trade practices.
Frameworks		
The World Bank Environment and Social Framework		The World Bank Environment and Social Framework (ESF) is a set of policies and guidelines for the World Bank Group to ensure socially and environmentally sustainable project implementation. It consists of ten environmental and social standards, covering labor conditions, community health, land acquisition, biodiversity conservation, and cultural heritage preservation. The ESF is based on international best practices and incorporates inputs from stakeholders. It requires borrowers to identify and mitigate adverse impacts, promote social inclusion, gender

Act, Rule, Policy, Guideline	Year	Relevant Provisions
		equality, and engage with affected communities transparently. It also emphasizes the protection of human rights, including indigenous peoples and vulnerable groups, and ensures projects do not lead to discrimination, displacement, or harm to cultural heritage. Compliance with the ESF is overseen through the implementation of Environmental and Social Management Systems (ESMS) by borrowers.
Environment and Social Management Framework (ESMF) of WaSGISP		The ESMF of WaSGISP is designed to manage environmental and social risks and impacts in sub-project planning, design, construction, and operation phases. It complies with Nepal's and the World Bank's requirements, including the ESF and ESSs. The ESMF provides guidance for subproject proponents to manage identified risks and impacts, and appropriate instruments, such as Brief Environmental Study, Initial Environmental Examination, ESIA, and ESMPs, are developed during planning and design.
Labor Management Procedure (LMP) of WaSGISP		Labor management planning is a strategic approach for organizations to manage their workforce and optimize resources. It aims to increase productivity, minimize costs, and improve operational efficiency by considering factors such as scheduling, workload forecasting, workforce utilization, performance management, and employee engagement. This document has been prepared for the WaSGISP. It will be updated separately according to the ground reality of each sub-project before the implementation phase of the sub-project starts.

Act, Rule, Policy, Guideline	Year	Relevant Provisions
Stakeholder Engagement Plan (SEP) of WaSGISP	2022 (2079)	<p>The Stakeholder Engagement Plan (SEP) plays an important role in ensuring effective communication and collaboration with all stakeholders involved in the project. For the same purpose, SEP has been made in this project as well. Since this is a living document, it is also updated from time to time. SEP mainly covers the following aspects:</p> <p>Inclusivity: SEP promotes inclusivity by actively involving stakeholders from diverse backgrounds, including affected communities, civil society organizations, and government agencies. By including all perspectives, the SEP promotes a sense of ownership and ensures that the needs and concerns of all stakeholders are adequately addressed.</p> <p>Transparency: By promoting transparency, SEPs help build trust and credibility among stakeholders. This ensures that relevant information is shared in a timely manner, allowing stakeholders to make informed decisions and participate meaningfully in project development and implementation.</p> <p>Collaboration: SEP facilitates collaboration by providing a structured framework for engagement. It encourages dialogue, knowledge sharing, and partnerships among stakeholders, fostering shared responsibility and teamwork to achieve project objectives.</p> <p>Risk Management: Effective stakeholder engagement minimizes potential risks and conflicts that may arise during project implementation. SEP enables early identification and mitigation of risks by creating channels of</p>

Act, Rule, Policy, Guideline	Year	Relevant Provisions
		<p>communication, allowing stakeholders to express concerns, and facilitating dialogue to find mutually beneficial solutions.</p> <p>Sustainable Development: The SEP aligns with the World Bank's commitment to sustainable development. By actively engaging stakeholders, the Bank ensures that project outcomes are socially, economically and environmentally sustainable, leading to better development outcomes and improved livelihoods for communities.</p>
Resettlement Framework (RF) of WaSGISP		<p>The Resettlement Framework outlines policies, procedures and guidelines for rehabilitating individuals or communities affected by development projects, addressing social and economic impacts, compensation, restoring livelihoods, and promoting social equity through transparent, participatory processes.</p> <p>This framework has been already formulated for the WaSGISP. However, it does not seem to be applicable as no one will be resettled in the Bheri Pumping Sub-project.</p>

CHAPTER 3

ESIA Methodology

This chapter presents an overview of the methodology adopted for this Environmental and Social Impact Assessment (ESIA). The primary objective of an ESIA is to predict possible impacts resulting from a proposed project, and to identify measures to avoid, mitigate, or remedy these potential impacts in accordance with the mitigation hierarchy. The process followed for ESIA in Bheri-Pumping Sub-Project (Package-I) has been illustrated in the **Figure 3-1**, which was tailored to meet the requirements of both the Government of Nepal, and World Bank's ESF requirements.

3.1 Environmental and Social Screening of the Sub-project

The environment and social screening of the sub-project was carried out by the E&S team of Project Management Unit (PMU) of WaSGISP from June 14 to 20, 2022 covering the project alignment from proposed Intake to households of Birendranagar Municipality. As per the Environment and Social Screening Report (ESSR), sub-project was deemed eligible as per the environmental and social standards in reference to the exclusion list and environment and social guidance of World Bank. Likewise, the project screening also determined that the sub-project activities do not have any adverse impacts on land and natural resources subject to traditional ownership or under customary use or occupation. The sub-project also does not cause relocation of indigenous peoples from land and natural resources subject to traditional ownership or under customary use or occupation. It was also deemed that the sub-project activities did not have any significant impacts on their cultural heritage that is material to the identity and/or cultural, ceremonial, or spiritual aspects. Thus, implementation of the Bheri Pumping Sub-project will not result in significant adverse impacts on IPs that may require Free, Prior, Informed, Consent (FPIC). Nonetheless, the affected IP population present in the area have been engaged through a meaningful consultation. The findings of ESSR document indicated that the Bheri-Pumping Sub-Project (Package-I of WaSGISP) falls under the category-II, and therefore it requires the preparation of an ESIA document as per the bank requirement (refer Annex 2 for the ESMF guidance for project categorization).

The baseline study of the project area was conducted in May 2023 by a multi-disciplinary team whose details have been presented in **Table 6** below. Details of findings from the

Baseline Study have been covered in Chapter 4(Baseline Environmental and Social Conditions/Baseline Data) of this ESIA report.

Table 6: Details of Members involved in the ESIA

S.N.	Name and Position of the Personnel	Academic and Work Experience
1.	Roshan Joshi Environmental Safeguard Expert (Team Leader)	A post-graduate in Environmental Science/Environmental Engineering with more than 7 years of relevant experience in water supply projects. Also, has experience as a team leader with sound knowledge of IEE. Has conducted more than 3 ESIA/IEE studies.
2.	Bharat Adhikari Social Safeguard Expert	A post-graduate in Sociology/Economics. Has experience as a sociologist in ESIA (and resettlement impacts) of more than three water supply/sanitation/water-based projects.
3.	Pratap Singh Tater Hydrogeologist	A post-graduate in Hydro-geology. Has experience as a hydrologist/geologist in more than three water supply/sanitation/water-based projects in environmental assessments.
4.	Ajita Devkota Water Supply and Sanitation Engineer-I	A postgraduate in Civil Engineering with more than 5 years of relevant experience in water supply systems. Has sound knowledge of ESIA.
5.	Richa Kaphle Water Supply and Sanitation Engineer-II	A post-graduate in Civil Engineering with more than 3 years of relevant experience in water supply/sanitation projects. Has sound knowledge of ESIA.

This report comprises of findings from conducted field studies and consultations with local people/stakeholders of the sub-project area. The assessment has followed the Environmental and Social Framework (ESF) of the World Bank, ESMF of WaSGISP and the provisions outlined in the Environment Protection Act, 2076 (2019), and Environmental Protection Rules (IPR) 2077 (2020) of the Government of Nepal (GoN).

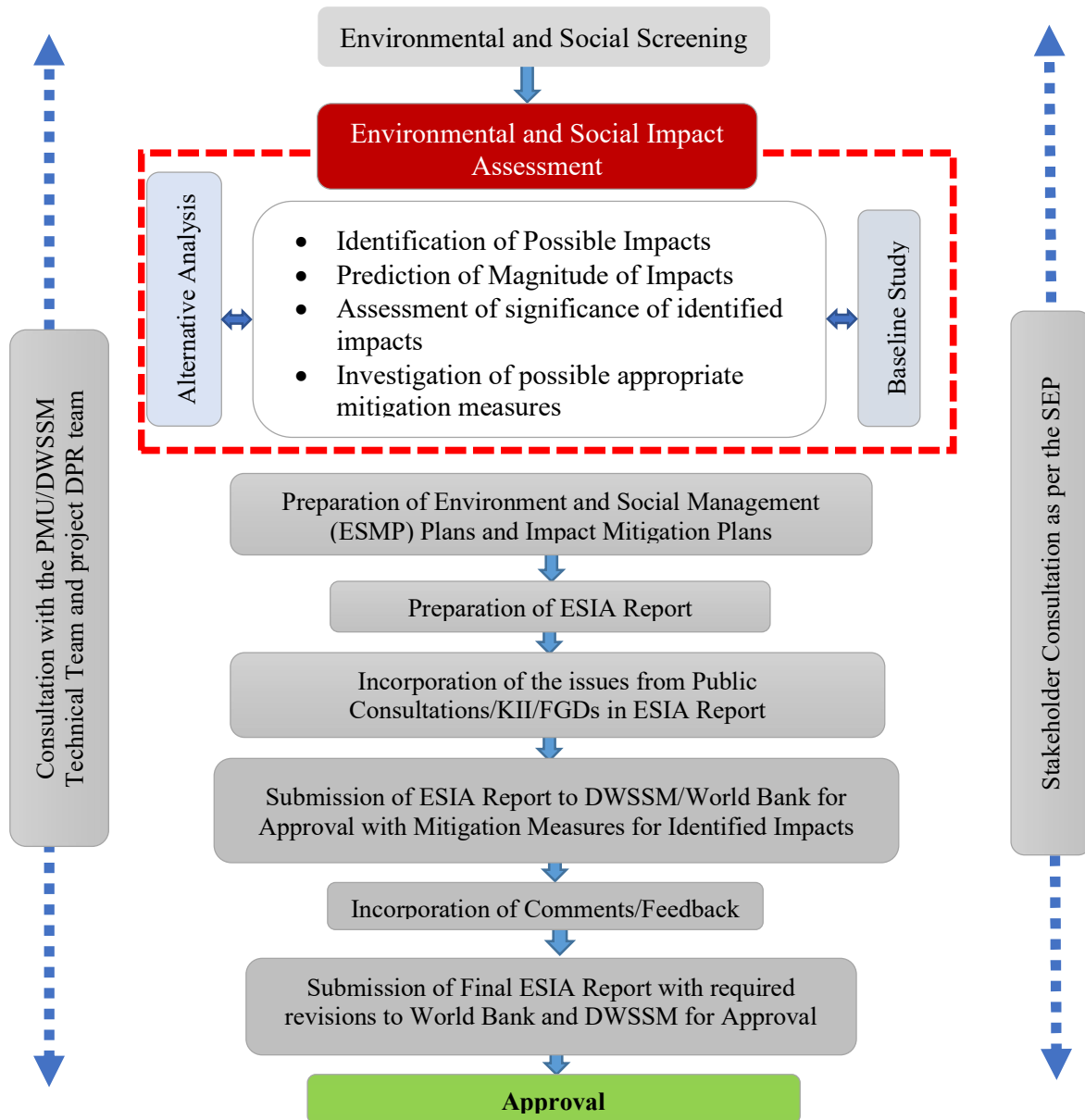


Figure 3.1: Illustration of the Methodology followed for ESIA Study

A systematic process was followed during the ESIA study wherein the potential impacts that Sub-Project could have on physical, biological, socio-economic, cultural and historical environment was both identified and evaluated, and measures that could be adopted in this sub-project to avoid, reduce, compensate or counterbalance the identified impacts were identified. The ESIA conducted for this sub-project has considered the possibility of not

only the direct and indirect impacts, but cumulative impacts as well. The key steps as outlined in the ESIA process (**Figure 3-1**) for Bheri-Pumping Sub-Project are as follows:

1. Determination of Project Area
2. Baseline Study
3. Alternative Analysis
4. Impact Assessment
5. Preparation of Environmental and Social Management Plans and Impact Mitigation Plans
6. Public Consultations/Key-Informant Interviews (KII)/Focus Group Discussions (FGDs)
7. Stakeholder Consultations as per the Stakeholder Engagement Plan (SEP)

The aforementioned steps have been described in detail in the following sub-sections.

3.2 Determination of Project Area

The project area is the area that may be affected by a Project's direct, indirect, and cumulative impacts resulting from the construction and operation activities of the Project. For Bheri Pumping Sub-Project Package-I, the direct, indirect, and cumulative impact areas are defined as follows:

Direct Impact Area: This area is directly affected by the project's construction and operation activities. The direct impact area for this project encompasses locations within the project's footprint or area of disturbance, households that will be directly affected by project construction and operation, and areas where ecosystem services could be influenced. Specifically, for this project, the direct impact area includes the following:

1. **Rani Chautari Community Forest:** This area will host the construction of the intake, water treatment plant (WTP), transmission lines, and access road adjacent to the Bheri and Jhupra River.
2. **Bheri, Shiva Shakti and Aishwarya Community Forests:** This area will host transmission lines required for the Bheri Pumping Sub-Project (Package-I).
3. **Amrit Danda:** This area will host the RVT (Reservoir Tank) and it will be located in Aishwarya Community Forest.
4. **Bulk Distribution System:** This area will host the bulk distribution system that will pass through the route from Amrit Danda-Deuti Bajai-Pipira Chowk of Ratna

Highway-Bangesimal, along the Right of Way (RoW) of the Ratna Highway. Bulk Distribution line will pass through adjoining settlements of wards 1,2,3,4,6,8,9,10,11 and 12 of Birendranagar Municipality, and ward number 10 of Lekbesi Municipality.

Indirect Impact Area: The indirect impact area encompasses regions that could experience indirect effects due to changes in ecosystem services, community health, or connections to local cultural heritage. Additionally, areas falling within administrative boundaries are considered part of the indirect impact area. Specifically, for this sub-project, the following areas have been categorized as part of the indirect impact area:

1. Ward No. 9 of Lekbesi Municipality: This area is home to the Tharubas Community.
2. Jhupra riverbank area: This region is inhabited by the Badi Community.
3. Adjoining rural/municipalities: The adjacent areas of Bheri Ganga, Baraha Taal, and Chingadh within the sub-project area are also part of the indirect impact area.
4. Ward no: 5,7,13,14 and 15 of Birendranagar Municipality are also part of the indirect impact area.

These areas are susceptible to indirect impacts related to changes in ecosystem services, community health, and connections to local cultural heritage as a result of the sub-project.

Cumulative Impact Area: The Surkhet Valley Watershed represents the cumulative impact area of the sub-project. The Surkhet Valley Watershed is the area affected by the sub-project, which includes water and sanitation initiatives in both the urban and rural areas of Birendranagar Municipality. About 40% of the project funds are allocated to activities within the Surkhet Valley, and these efforts involve consolidating small water supply schemes in coordination with the municipality. To fully understand the impact of these activities, one must consider their combined effects on the Surkhet Valley Watershed, including impacts on water resources, forests, biodiversity, erosion, and landslides. This assessment will also factor in existing, planned, and foreseeable future developments in the region. These cumulative impacts define the extent of the sub-project's influence on the area.

3.3 Baseline Study

Baseline study comprises of collection and assembling of information that will aid in understanding the baseline environmental and social conditions within the project area. It is an important step in the methodology wherein existing environmental and social features for a project are studied. Both primary and secondary data sources (literature review, reports etc.) have been referred to for this study.

Desk Study

A critical early step in the ESIA process involves collecting and assembling information to understand and characterize baseline physical, biological, and social conditions within the project impact area. This information is gathered from a review of the available literature and secondary sources, as well as primary data collection through field methods. Available useful data and information with the line agencies at the local, district and central level were collected and reviewed during the desk study. Possible sources of information at the project area were Birendranagar Municipality, Surkhet Valley Water Supply Users Organization (SVWSUO), Divisional Forest Office, Ministry of Industry, Tourism, Forest and Environment, Karnali Province (MoITFE), Ministry of Water Resource and Energy Development (MoWRED), other line agencies, related NGOs and other project offices in the district were also referred to for literature review. The references taken are listed as follows:

a) For Physical Environment:

- IEE reports of other water supply and/or sanitation projects
- ESIA reports of world bank projects
- DPR of the Bheri-Pumping Sub-Project
- Available air-quality and noise level data from MoFE, rainfall data from Department of Hydrology and Meteorology

b) For Biological Environment:

- IEE reports of other water supply and/or sanitation projects
- ESIA reports of world bank projects
- DPR of the Bheri-Pumping Sub-Project

- Online species distribution maps produced by the Integrated Bio-diversity Assessment Tool (IUCN, 2019), IUCN Red List Version 2019-1
- Birendranagar Municipality Multi-Hazard, Vulnerable and Risk Profile Report (2022)

c) For Social, Cultural and Historical Environment:

- IEE reports of other water supply and/or sanitation projects
- ESIA reports of world bank projects
- DPR of the Bheri-Pumping Sub-Project
- National Population and Housing Census data (CBS, 2021),
- Profiles of Surkhet district, Birendranagar and Lekbesi Ward-No. 10 Municipalities,
- Existing literature and studies on benefit sharing,
- Municipality Plans and Policies, and
- Various Acts/Regulations/Guidelines/Standards etc.

Information on air, water, and noise quality of the project area, physical location of the project area, and details on rock type, soil type, slope stability, erosion, landslides, etc. of the project area, were collected during the desk study of this ESIA. Information on meteorological data (maximum and minimum temperature, and rainfall distribution pattern), topographic data (elevation and landscape), and the land use pattern of the project area, were also collected during the desk study. Furthermore, the status of existing flora and fauna, and socio-economic/cultural profile in Birendranagar Municipality and ward number 10 of Lekbesi Municipality was extracted during the literature review.

Field Study

To gather primary data, field study was conducted for both Birendranagar Municipality and Lekbesi Municipality to extract site-specific information and validate the data collected through secondary sources. Field study also played a crucial role in filling gaps in the information from literature review. The assessments carried out in the field for this sub-project to collect primary data are elaborated as follows:

A. Physical Environment Assessment:

Information on air, water, and noise quality of the project area, the physical location of the project area, details on rock type, soil type, slope stability, erosion, landslides, etc. of the project area, were collected during the field visit for ESIA. Information on meteorological data (maximum and minimum temperature, and rainfall distribution pattern) of the project area, topographic data (elevation and landscape), and the land use pattern of the project area, were also cross verified during the ESIA study in coordination with the local communities of the project site and the relevant Municipal agencies.

For the air quality assessment, air quality of Birendranagar Municipality was measured in real-time during the field visit in May 2023. The tool used for measuring air quality is an application called “AirVisual” that works on both android and iOS cellular phones. The average air quality index during the daytime was recorded by the environmental and social experts of the ESIA team in the field.

For the water quality assessment, water from the Bheri River was sampled and sent to the Water Quality Testing Laboratory of Birendranagar, Surkhet for quality analysis. The results from the lab indicated that the conditions of the Bheri river are within the permissible range for physical (temperature, pH, electrical conductivity), chemical (iron, arsenic, ammonia, total hardness, calcium, residual chlorine), and microbiological (Faecal coliform) factors except for the turbidity factor of the Bheri river, which is a common issue for rivers during monsoon. Altogether, 11 physical, chemical and microbiological parameters were observed as per the NDWQS 2079. The water quality assessment report showed higher level of turbidity than the permissible limit of NDWQS.

For the noise quality assessment, an application called “Sound Level” was used to record the noise levels on site. An average value was recorded and based on the collected data, it was found that the sound recorded during the daytime was within the permissible range i.e., below 45 decibels making the sub-project site area a “Silent Zone” area.

Lastly, regarding the geology of project site, it was observed upon site visit by the Environment and Social Experts, and Hydro-geological expert that there are varieties of rock types in the Birendranagar municipality that comprises sedimentary rocks, meta-sedimentary rocks, and low to medium-grade metamorphic rocks of Pre-Cambrian to

Neogene time. Moreover, rounded to sub-rounded boulders, cobble, and gravels with sand and clay layers were found as deposits near the Bheri river intake site.

Details regarding the findings of the physical environment assessment have been provided in Chapter 4 (Baseline Environmental and Social Conditions/Baseline Data) of this ESIA report.

B. Biological Environment Assessment:

During the field visit in May 2023, biological environmental studies focused on the floral and faunal survey of the sub-project area were conducted. The assessment followed the National Forest Inventory Guideline (2006) and was carried out in close coordination with the Surkhet Divisional Forest Office (DFO), Community Forest Users Groups (CFUGs), and other relevant stakeholders. Consultations with the DFO were held to gain an overview of the forest types in the project impact area and to obtain lists of floral species and CFUGs within the area.

Details of the flora of the sub-project area were enumerated based on the Annual Report of the Divisional Forest Office in Surkhet. All of the aforementioned information was supplemented by interactions with the local community. Consultations with CFUGs were held to document key features of the community forests and user groups, their major activities, and key forest types and floral species found in the area, including culturally and economically important floral species. These consultations also provided information on the major Non-Timber Forest Products (NTFPs) and medicinal plants found in the area.

The total forest area required for the Bheri Pumping Sub-Project was demarcated, and a walk-through survey was conducted with representatives from the Divisional Forest Office in Surkhet. During this walk-through survey, a census survey of the trees, poles, and saplings inside the demarcated area was conducted for the construction site of the Intake, Water Treatment Plant (WTP), Transmission line, Reservoir Valve Tower (RVT), Access Road, etc.

Similar to the vegetation and forest assessment, a participatory approach for fauna surveys (including herpetofauna, mammals, and birds) was implemented in close coordination with the DFO, CFUGs, and other relevant stakeholders. Opportunistic observations of terrestrial wildlife and wildlife signs encountered during the course of vegetation sampling activities

were recorded. Signs indicative of terrestrial wildlife presence included pug marks or footprints, droppings, tree markings, nests, burrows, odors, leftover food items, animal remains, and other evidence. Additionally, all water sources were opportunistically surveyed during the fieldwork to document wildlife use of water bodies. The presence of bird species was documented through consultations with local residents, DFO personnel, and CFUG members. According to the local people of the sub-project site, both local and migratory birds are found within the project area, but none of these are endangered species.

In addition to field surveys, structured interviews and community consultations using pictorial guides were conducted to obtain local information regarding flora of ethnobotanical significance, wildlife use of the area, hunting, and other traditional practices involving wildlife, as well as the presence of rare and endemic flora and fauna species.

Furthermore, at present, the sub-project does not anticipate any major impact on the aquatic life of the Bheri River. The ESMF requires that the water intake structure to be used will not have barrier across the river which affects movement of fishes/ aquatic life. The water intake at river, where needed, will be side intake, meaning it will not be built across the river. It will be built on the one bank of the river. There will be no dam or barrage or weir covering the whole width that impedes fish migration. Only 0.97% of the lowest flow will be withdrawn from the Bheri River during dry season. In fact, sanitation activities of the WaSGISP are expected to have significant public health and environmental benefits by limiting sewage flooding and the discharge of untreated effluents in drainage systems.

Details regarding the findings of the biological environment assessment have been provided in Chapter 4 (Baseline Environmental and Social Conditions/Baseline Data) of this ESIA report.

C. Socio-economic, Cultural and Historical Environment Assessment:

Stakeholder consultations, Key Informant Interviews (KIIs), community mass meetings, and Focus Group Discussions (FGDs) were conducted to gain an understanding of the project site. Various communities including the Tharubas community, the community from Amrit Danda, Badi community were included in these consultations/discussions/interviews, which saw active participation especially, from women and marginalized groups.

The information collected through the aforementioned methods covered the present status of education, health, water supply and sanitation conditions, demographics, caste, land use patterns, income and expenditure, local traditions, religion, culture, and migration patterns of the local people in the project area. All of this information were collected to get the perspective of the local people on the proposed project. The baseline quantitative information was based on the National Census 2021.

FGDs and community mass meetings were conducted to obtain suggestions and comments from all potential stakeholders which included different communities in Birendranagar Municipality and ward number 10 of Lekbesi Municipality, Water User Committees, Forest User Committees, Marginalized Groups (Dalits), and communities in Amrit Danda site. In particular, during the FGD with the Badi community, they were very optimistic about the opportunities that the construction of the sub-project would bring forth. They appeared hopeful about getting employment after the project commences. The minutes with details of participants have been attached in Chapter 5 (Stakeholder Engagement and Public Consultations) of this ESIA report.

Consultations/Group discussions were organized by the team so that special attention could be paid to the problems of specific target groups like the women, children, and farmers in the project area. The consultations with the locals were also overseen by the consultants from the World Bank E&S team. Moreover, the discussion was also attended by the leaders, teachers, and officials from the water supply unit of the municipality and line agencies.

Key Informant Interviews (KIIs) were another method used to collect information on socioeconomic and cultural activities during the field visit. People from different locations were included in this interview in an inclusive manner. Information on basic demographic and migration patterns, food sufficiency and cropping patterns, the existence of user groups/committees, public facilities, and infrastructure, availability of labor force, the existence of archaeological and religious sites, etc. were collected through these interviews.

In general, all the stakeholders of this project are very positive about this water supply project and are confident that its construction will provide a long-term solution to the existing water supply problems and generate employment opportunities for the locals.

A direct observation method was adopted to ascertain the existence of cultural sites, and public institutions such as temples, crematoriums, historical and archaeological sites,

schools, and health posts. This was also done to determine the main areas of the project, and the impact of the project on these sites due to the project construction activities.

Details regarding the findings of the socio-economic and socio-cultural environment assessment have been provided in Chapter 4 (Baseline Environmental and Social Conditions/Baseline Data) and Chapter 5 (Stakeholder Engagement and Public Consultations) of this ESIA report.

D. Cumulative Impact Assessment Process

As a part of the impact assessment process, a Rapid Cumulative Impact Assessment (RCIA) was conducted. The RCIA process is present in Chapter 7.

3.4 Analysis of the Collected Data

The information extracted from the desk study and field visits were processed in a standard format to maintain overall consistency. Findings for the physical, biological and socio-economic/cultural/historical environment were interpreted based on the assessments conducted of the sub-project area. The impacts were extracted from the collected data post its in-depth analysis. Corresponding mitigating and monitoring measures based on the identified impacts were proposed during this study which has been discussed in great detail in Chapter-7 (Environmental and Social Risks and Impacts) of this ESIA report.

3.5 Alternative Analysis

Alternatives were considered early on during the ESIA, and project design process. This is one of the best ways to avoid or minimize possible project impacts. The ESIA team, technical team of Project Management Unit of Water Sector Governance and Infrastructure project, and the DPR team (involved in design of Bheri-Pumping Sub-Project) closely coordinated regarding finalization of design with consideration to environmental and social impacts, including issue of access road, electricity transmission lines, hydrology and flood level specifics. This was done to minimize possible impacts and ensure that the project is in line with the Environment and Social Framework of the World Bank.

During the course of this study, alternatives for Bheri river intake site, and access road were compared and contemplated before finally being finalized. Chapter 7 (Alternative Analysis) of this ESIA report has provided detailed elaboration of alternatives assessed for this sub-

project, and process followed thereafter. This analysis included both “without project” and “with project” alternative.

3.6 Impact Assessment

The ESIA evaluated the possible direct, indirect and cumulative impacts and risks of this sub-project in both construction and operation phases of the project. Impacts have been categorized for physical, biological, and socio-economic & socio-cultural environments in detail during this study. Project relevant and suitable mitigation measures were also recommended to minimize, mitigate, and compensate for possible unavoidable impacts.

Impact Evaluation process followed for this ESIA has been illustrated in the figure below:

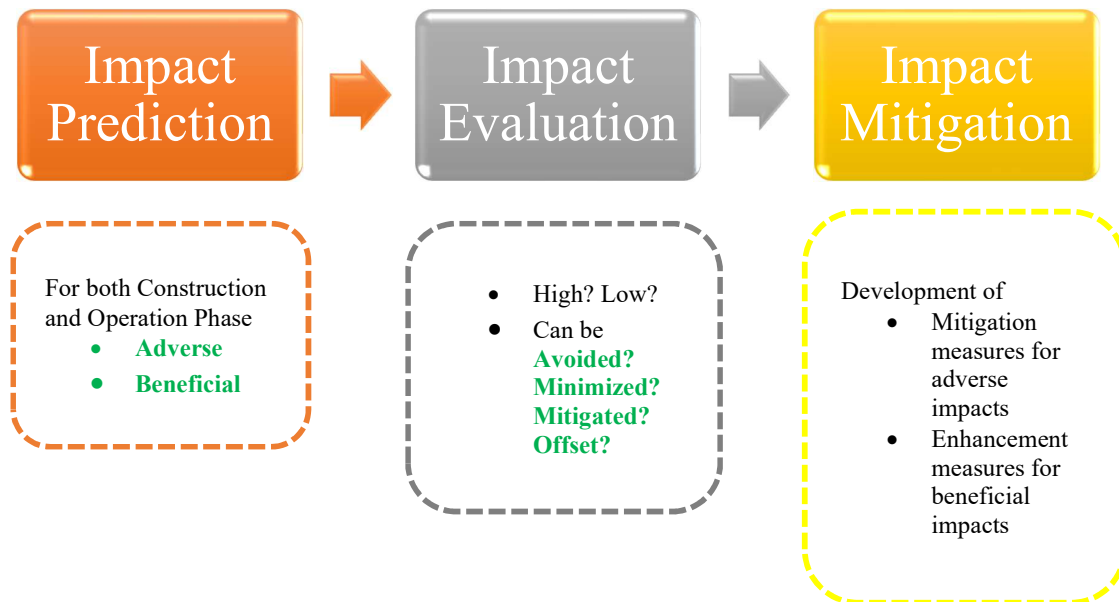


Figure 3-2: Process of Impact Assessment

Impact Prediction:

Possible environmental and social impacts due to the proposed project activities of Bheri Pumping Sub-Project (Package-I) were first identified based on the desk study, literature review, and field survey conducted. The impacts were categorized as “Adverse” or “Beneficial” based on their effects on the sub-project site area, and were identified for physical, biological, and socio-economic/socio-cultural environment during both

construction and operation phases of the project. This has been reflected in the Environment and Social Management Plan (ESMP) section in Chapter 7 (Environmental and Social Risks and Impacts) of this ESIA report.

Impact Evaluation:

The identified environmental and social impacts were evaluated as either “adverse” or “beneficial”. The adverse impacts are evaluated, avoided to the extent possible and mitigated as required and the beneficial impacts are enhanced. Details regarding this process have been included in (ESMP) section in Chapter-7 (Environmental and Social Risks and Impacts) of this ESIA report.

Impact Mitigation:

Based on the information extracted, reference of previous similar issues in other projects, consultations held with the locals, community groups, relevant stakeholders, and discussions with the technical team of Project Management Unit of WaSGISP & DPR team, mitigation measures for identified environment and social impacts were developed and recommended. The mitigation measures have been provided for adverse impacts during construction phase and operation phase after construction. Moreover, enhancement measures have been provided for the beneficiary impacts in the project area due to the proposed sub-project activities.

Details regarding the impact assessment have been provided in utmost detail in Chapter-7 (Environmental and Social Risks and Impacts) of this ESIA report.

3.7 Preparation of Environmental and Social Management Plans and Impact Mitigation Plans

Environment and Social Management Plan (ESMP) which is one of the major deliverables of this Environmental and Social Impact Assessment (ESIA) for Bheri Pumping Sub-Project (Package-I) was developed during this report preparation. ESMP will be an integral part of the bid-document for this sub-project and will be a guide for Environment and Social risk management works during the project construction and operation phase of the project.

The ESMP and Impact Management Plans were developed and finalized after in-depth discussions and consultations with the relevant local stakeholders of the project site (during

field visit), and consultations with the technical team of Project Management Unit of WaSGISP (during detail design, bid document preparation and finalization process). Plans for mitigating adverse impacts and enhancing beneficial impacts of proposed project activities have been developed and recommended in this report. This has been done for physical, biological, and socio-economic & socio-cultural environment of sub-project during both construction and operation phase. Furthermore, both short-term and long-term management of environmental and social issues have been addressed.

Some of the management and mitigation activities that have to be developed later on in the project shall be part of the Contractor's ESMP (C-ESMP) such as the Muck disposal Plan, Traffic Management Plan, Occupational Health and Safety Plan, Landslide and Slope Stabilization Management Plan, Emergency Preparedness and Response Management Plan, Community Health and Safety Management Plan etc.

3.8 Stakeholder Consultations as per the Stakeholder Engagement Plan (SEP)

Stakeholder engagement is a crucial element of project management, ensuring the incorporation of diverse stakeholders' concerns and perspectives. By fostering transparency and collaboration, it ultimately enhances the decision-making process, yielding more effective outcomes. A Stakeholder Engagement Plan (SEP) which is a living document was prepared early in the project's planning phase to ensure effective stakeholder engagement during the course of the Project.

Stakeholder Engagement activities undertaken up until the preparation of this ESIA report are as follows:

- Public Gatherings
- Focus Group Discussions
- Household Visits
- In-depth Interviews

At the outset of the public consultation, all participants were provided with clear explanations, in a language they could comprehend, regarding the facilities that users will be provided with from the upcoming Bheri Pumping sub-project. Additionally, the potential

environmental and social impacts that may arise from the sub-project activities were outlined, along with the proposed measures to mitigate or prevent these impacts.

Stakeholders were equipped with information about the risk reduction measures, ensuring that they are well aware of the steps taken to minimize adverse impacts and maximize project benefits. Moreover, they were informed about the establishment of procedures to address any legitimate complaints concerning the project. Should any stakeholder have concerns or grievances, mechanisms were implemented to address and resolve such matters in a fair and transparent manner.



Figure 3-3: Public Consultation in Amrit Danda site of Birendranagar Municipality

Public consultations, focus group discussions (FGDs), in-depth interview, and information dissemination processes were carried out in the project area of Bheri Pumping Sub-Project (Package-I) to inform the local people and concerned stakeholders about the sub-project, and to inquire about their concerns, issues and suggestions regarding the project. Series of consultations were held with the communities in the Birendranagar Municipality and also with the ward no. 9 and 10 of Lekbesi Municipality especially in the project affected area of Amrit Danda. Consultations were also held with the Water Supply User Committees, Forest User Committees, and marginalized groups such as the Dalit community.

The consultations proved highly valuable in gathering information about the current challenges encountered by communities in terms of both environmental and social aspects.

These public consultations involved the active participation of various institutions, line agencies, NGOs, and media in Surkhet. Women, in particular, expressed great enthusiasm regarding the potential opportunities that this project could offer. The potential opportunities in regard to what Bheri Pumping Sub-Project has to offer are employment generation for people of Birendranagar Municipality and Lekbesi Ward No. 9 and 10 municipality, marginalized communities, and improvement in quality of life.

The people in the sub-project site area are hopeful about several aspects, including the generation of employment opportunities through recruitment during the project's construction phase and operation phase. They also anticipate that the supply of water to households in the municipality after construction will save locals time, allowing them to focus more on their livelihood activities. Additionally, they look forward to the potential for capacity development and skill enhancement opportunities.

Details regarding the Stakeholder Consultations as per the Stakeholder Engagement Plan have been provided in utmost detail in Chapter-5 (Stakeholder Engagement and Public Consultations) of this ESIA report.

CHAPTER 4

Baseline Environmental and Social Conditions/Baseline Data

The physical, biological and socioeconomic environment are all interrelated. The physical environment refers to the natural surroundings that exist in a particular area. This includes features such as landforms, water bodies, climate, and soil composition. The biological environment on the other hand encompasses all living organisms that inhabit a given area, including plants, animals, and microorganisms. The socioeconomic environment refers to the economic and social conditions that influence the quality of life in a community. This includes factors such as income levels, education, employment opportunities, and access to healthcare.

Together, these three environments play a crucial role in shaping the overall well-being of individuals and communities. For example, a healthy physical environment can provide clean air and water for drinking and recreation while also supporting diverse ecosystems that contribute to biodiversity and ecological stability. A thriving biological environment can provide food sources for humans and other animals while also regulating climate patterns through processes such as photosynthesis. The socioeconomic environment is also equally important in determining quality of life outcomes. For instance, access to education and employment opportunities can help individuals achieve both economic stability and adequate healthcare.

4.1 Physical Environment

Topography

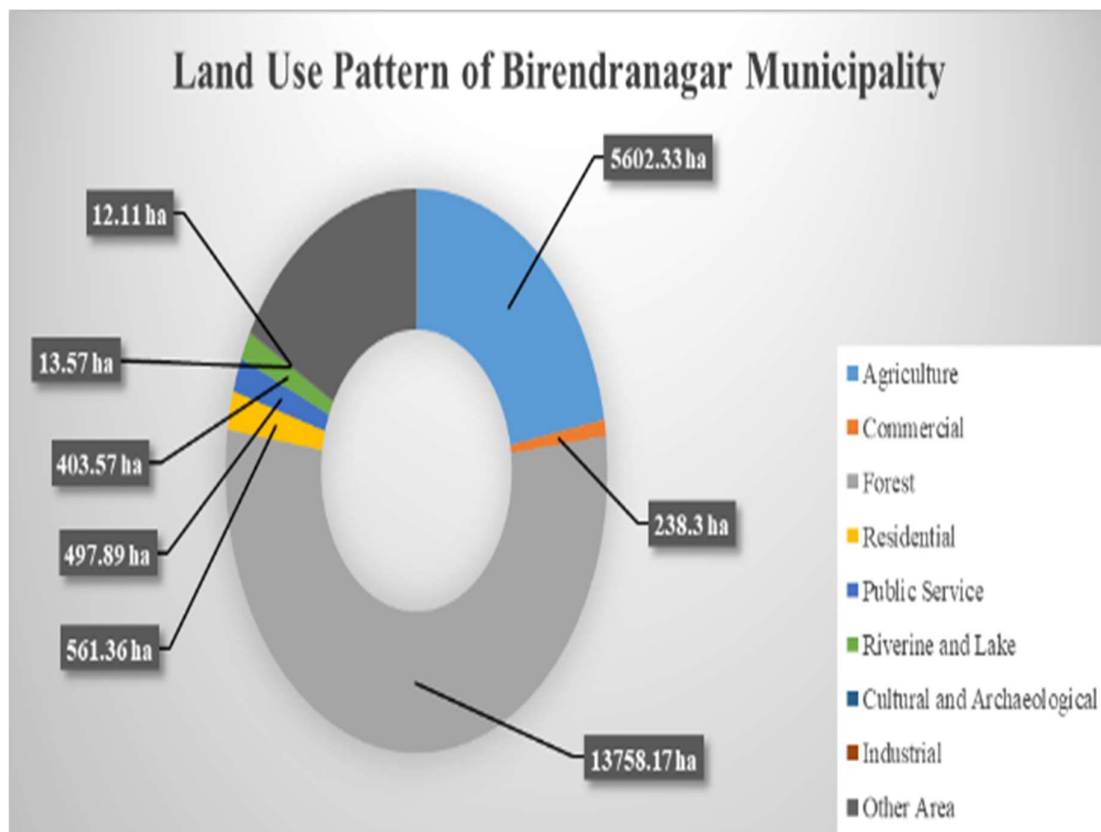
The project area is situated in the Surkhet District in the Karnali Province of Nepal's Birendranagar Municipality. The entire Birendranagar municipality, which is also the capital of Karnali Province, is the project's service area. The project area is located at 81.63330 Longitude and 28.600 latitude. The project area's elevation varies by a minimum of 342 m and a maximum of 2252 m.

Surkhet Valley: Surkhet Valley is a valley located in Nepal's Inner Terai. It shares boundaries with the Achham, Dailekh and Jajarkot districts to the north, Salyan district to the east, Banke, Bardiya and Kailali districts to the south, and Doti district to the west. The project area has fluvio-lacustrine sediments (sand, silt, clay, cobbles, and pebbles) deposited

from the northern and southern Siwalik Hills. Both the northern and southern portions of the Siwalik Hills consist of hard rocks including sedimentary, meta-sedimentary, and metamorphic rocks.

Land Use

Birendranagar is the provincial capital of Karnali and because of this, increased government investments have been observed in the Birendranagar Municipality for economic and infrastructure development. This has in turn attracted more migrants. The construction of a ring road around the city is expected to stimulate business, development, and industrial activity, further accelerating urbanization and transformation of LULC in the near future (Rijal, S., Rimal, B., Sloan, S., 2018)



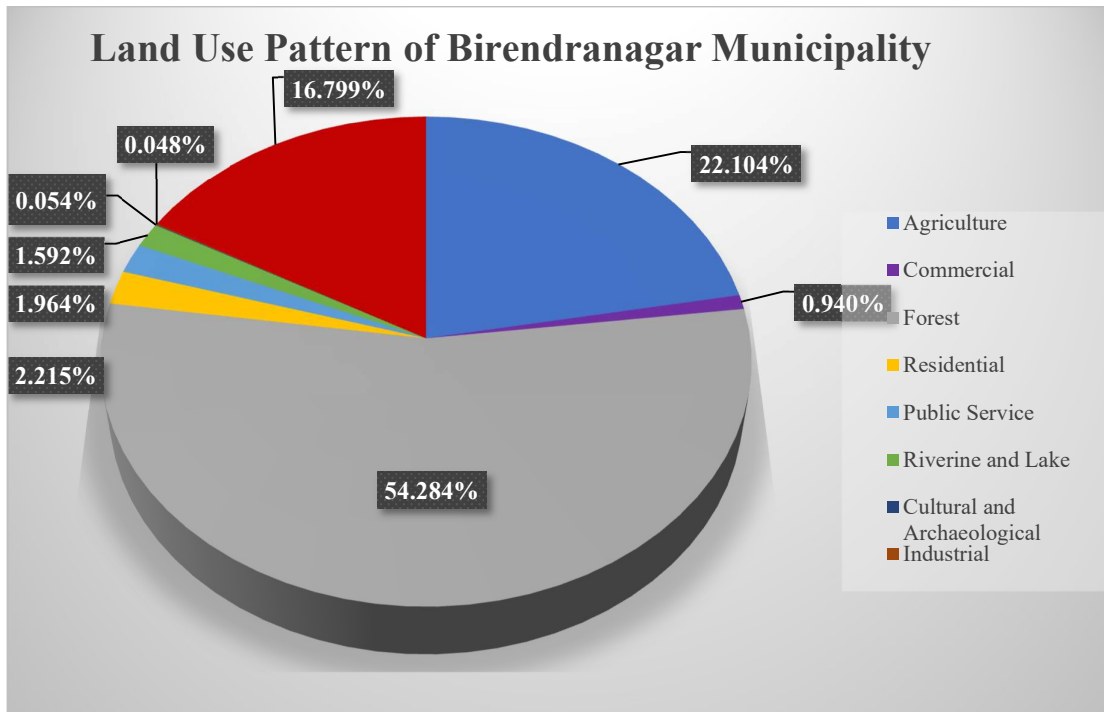


Figure 4-1: Land Use Pattern of Birendranagar Municipality

The land use pattern in Birendranagar Municipality as shown in the figures above has been classified as agriculture land (5602.33 hectares), commercial area (238.30 ha), forest (13758.17 ha), residential (561.36 ha), public service (497.89 ha), riverine and lake (403.57 ha), cultural and archaeological (13.57 ha), industrial (12.11 ha) and other area (4257.73 ha).

Forest of Birendranagar covers 54.28% of total municipal area followed by Agricultural land that covers around 22.10% of the total area. Public Service and Residential area cover around 1.96% and 2.21% of the total area respectively. Similarly, Riverine and lake area occupies around 1.59% of the municipal area. Commercial area, Cultural and archeological area, and industrial area occupy less than 1% of the municipal area.

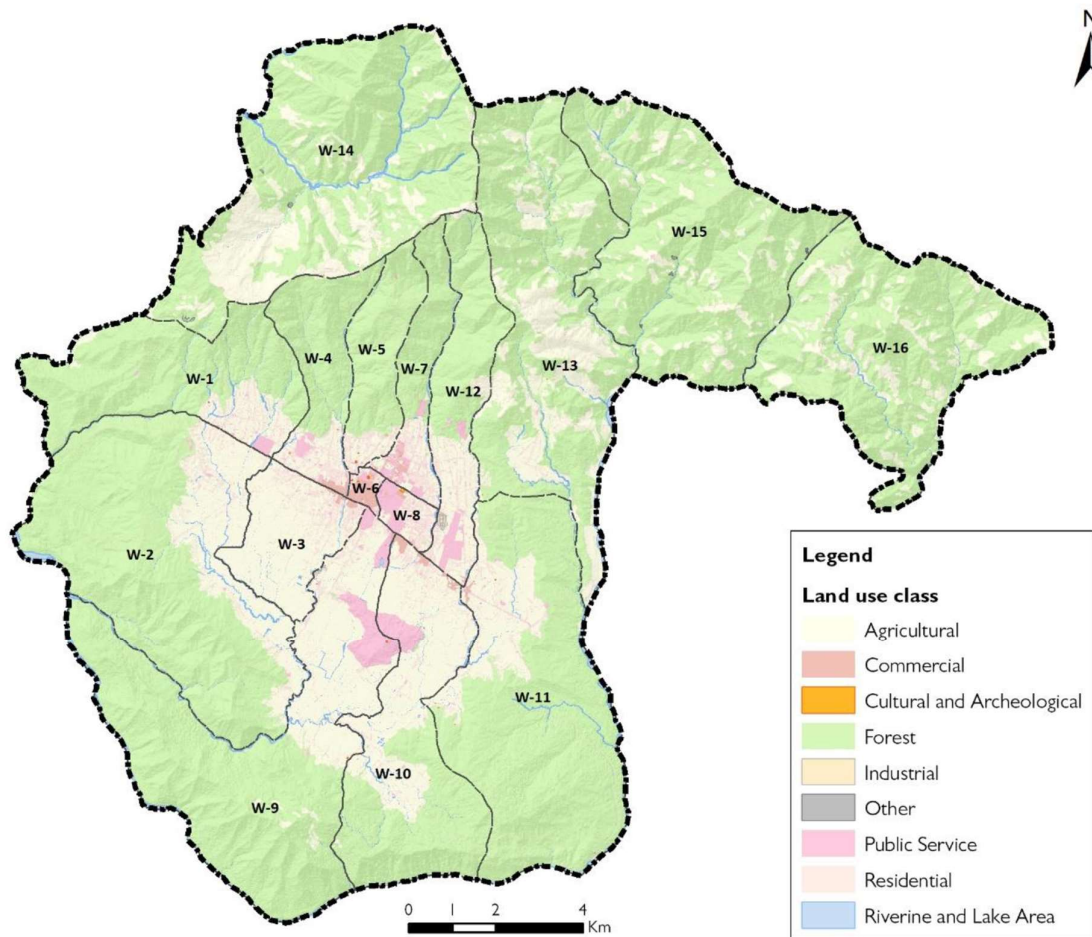


Figure 4-2: Land use map of Birendranagar Municipality

(Source: Multi Hazard, Vulnerability and Risk Profile of Birendranagar Municipality 2022)

Potential erosion and landslide prone areas

The study area lies in Siwalik region of Nepal Himalaya. Siwalik Himalaya is a broad zone lying between the Lesser Himalaya on the north and Indo Gangetic Plain on the south. The Siwalik Himalaya is composed basically of the middle Miocene to Upper Pleistocene sedimentary rock sequences. Similarly, sandstone, mudstone, siltstone, and conglomerate beds are observed in the eastern and southern region. The regional altitude of the bedding plain is N55W/48NE. The area is very fragile as it is in Siwalik formation and is very vulnerable to landslides. Additionally, Ranimata Thrust, Bheri Thrust, and Surkhet Thrust also pass through Birendranagar municipality.

The sub-project area falls under the upper Siwalik region. As per the study conducted on “Multi Hazard, Vulnerability and Risk Profile of Birendranagar Municipality 2022”, the

upper Siwalik is the youngest litho-stratigraphical unit of Siwalik, which is the youngest mountain range of the Himalaya. It is characterized by coarse boulders beds and conglomerates with less sandstones and sandy clays as binding materials. The Upper Siwalik covers only about 1.67% of the Birendranagar municipality and is exposed in the southernmost part of the municipality. The Upper Siwalik comprises of immature and poorly consolidated conglomeratic beds that can be disintegrated easily due to high water content. As a result, debris flow begins from this zone. There is Bheri Thrust between Upper Siwalik and Lower Siwalik within this municipality, on which the rocks of Lower Siwalik thrust over the Upper Siwalik. The thrust passes trending east-west very close to Bheri River. This lithological unit is also prone to surface erosion.

Rainfall is one of the major triggering factors for landslide occurrence in the Birendranagar Municipality. The rocks in the project area are already weathered, highly jointed, and fractured, and most of the municipality comprises of thick colluvial soil. The intense rainfall thereby triggers landslides and debris flow in this terrain. An active landslide prone area was observed in the Ratna highway along the Shiva shakti Community Forest at a distance of 4 KM from the Bheri river bridge along the Birendranagar Municipality. The primary cause of surface erosion and gully erosion in the study area is heavy rainfall. While conducting field observations, significant gullies were observed in the mudstone rocks of the Lower Siwalik Unit along the transmission line in the Aishwarya community forest region, where vegetation is low.

Climate

Nepal encounters a range of climatic conditions, influenced by both seasonal variations and altitude levels. The country can be divided into distinct climatic zones based on its elevation. The Terai region, located in the southern part, lies at an altitude below 500 meters above sea level, while the High Himalayan region in the north extends to a height surpassing 5,000 meters. Progressing from south to north, there's a gradual decline in average temperature, starting from a peak of over 24°C in the southern areas to sub-zero temperature in the highest mountainous regions of Nepal.

Precipitation patterns exhibit spatial variation throughout the country, with specific central and northern regions receiving over 3,000 millimeters (mm) of rainfall. The central and

southern plains generally experience precipitation ranging from 1,500 to 2,000 mm, while certain high-altitude northern areas receive less than 1,000 mm.

**Monthly Climatology of Min-Temperature, Mean-Temperature, Max Temperature & Precipitation 1991-2020
Mid Western, Nepal**

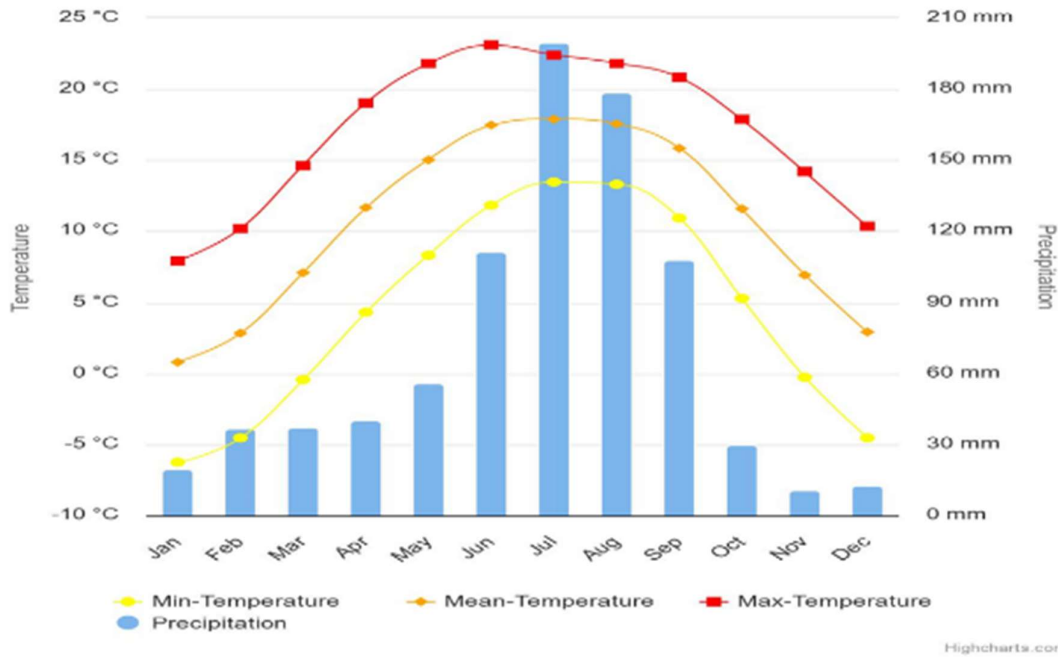


Figure 4-3: Monthly Climatology of Karnali Province from 1991-2020

Source: Climate Change Knowledge Portal, The World Bank, 2023

The project's designated province, Karnali Province, boasts a subtropical climate. The average maximum temperature fluctuates between 7 and 23 degrees Celsius, and the average minimum temperature ranges from -7 to 13 degrees Celsius, as depicted in figure 4.3 above.

Observed Average Annual Precipitation of Mid Western, Nepal for 1901-2021

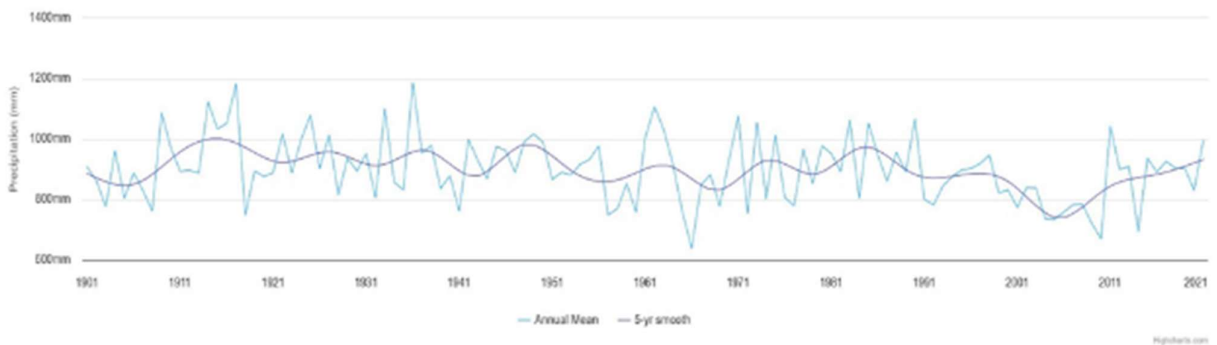


Figure 4-4: Average Annual precipitation of Karnali Province

Source: Climate Change Knowledge Portal, The World Bank, 2023

The figure 4-4 above illustrates that in the year 2021, Karnali Province experienced an average annual precipitation of 997.32 mm.

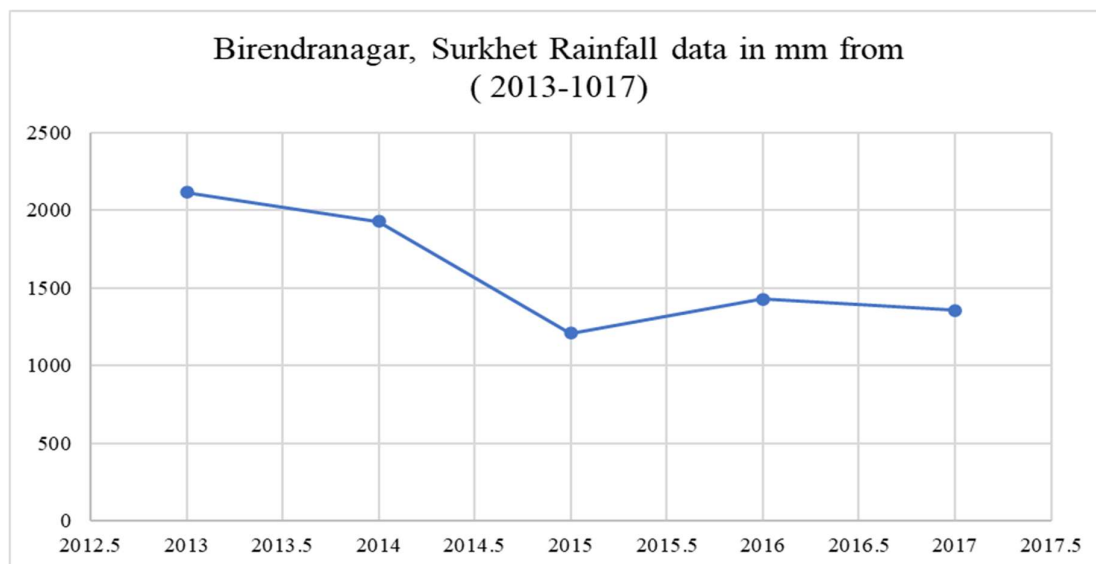


Figure 4-5: Average Annual precipitation of Birendranagar, Surkhet

(Source: Department of Hydrology and Meteorology)

Figure 4-5 above illustrates the average annual precipitation of Birendranagar Municipality, Surkhet from the year 2013 to 2017.

Hydrology

Hydrology involves the examination of how water is distributed, and how it moves across the Earth's surface and beneath it, along with the influence of human activities on water availability and conditions. The Bheri River serves as a significant tributary of the Karnali River, originating in the western Dhaulagiri range in Nepal's west and flows through the Surkhet valley before merging with the Karnali River. The river emerges from an altitude exceeding 5000m. Close to the confluence of Jhupra Khola, the Bheri River was identified as a suitable site for water intake.

As per the DPR report of Bheri Pumping Package-I, data from the Jammu station regarding maximum river flow reveals that a flood with a recurrence period of 100 years is projected to reach a volume of 6201 m³/s. Moreover, for planning purpose, the low flow occurring once every 5 years stands at 57.604 m³/s. To accommodate the impact of the upstream Bheri Babai multipurpose project, a deduction of 40 m³/s is considered. These flow parameters hold a significant role in comprehending and managing the water resources of the Bheri

River, ensuring effective infrastructure planning and the implementation of flood control measures.

Water Supply

The Birendranagar valley is connected to multiple streams, such as Itram, Khorke, Neware, Tuni, and Sot Khola. Most of these streams remain dry during winter but carry monsoonal runoff during the rainy season, leading to floods, soil erosion, and riverbank erosion. The current sources of water for the Surkhet Valley include river discharge and underground water. The combined flow from rivers and groundwater during the dry season amounts to approximately 8064 cubic meters per day.

Table 7: Water Supply situation of Surkhet valley

S. N	Source	Location	Present feeding Rate (lpm)	Operating hour (Hrs)	Production Per day(cum/d)
1	Jhupra Khola	Jhupra river at North-East of Surkhet valley	2700	24	3888
2	Khari Khola	Khari river at Northeast of Surkhet valley	1800	24	2592
3	Itram river	Itram river in Surkhet Valley	600	24	864
4	Khorke River	Khorke river in Surkhet Valley	300	24	432
5	Bulbule Sumpwell	Bulbule lake	300	16	288
	Total				8064

Source: DPR of Surkhet valley Bheri Pumping

Geology

The Birendranagar Municipality is situated in the Western Nepal Himalaya, encompassing Siwalik, the Intermontane Basin of Surkhet Valley, and the Lesser Himalaya. This municipality includes the entire intermontane basin of Surkhet, known as Dun Valley in terms of its physiography. The formation of this intermontane basin can be attributed to tectonic movements during the upliftment of the Siwaliks. Within the municipality, there

exists diverse range of rock types, which encompass sedimentary rocks, meta-sedimentary rocks, and low- to medium-grade metamorphic rocks spanning from Pre-Cambrian to Neogene times.

The valley itself is filled with loose and unconsolidated alluvial deposits classified as Quaternary Deposits. These deposits mainly consist of rounded to sub-rounded boulders, cobble, and gravels, intermixed with layers of sand and clay. The metasedimentary rocks of the Lesser Himalayan Zone, located to the north, are separated from the Siwalik rocks by the Main Boundary Thrust (MBT). Additionally, three other regional thrusts play a role in shaping the geomorphology of the Birendranagar Municipality. Surrounding the Surkhet Valley in the east, south, and west are sedimentary rocks like sandstone, mudstone, siltstone, and conglomerate, which constitute the primary lithology of the Siwalik. Meanwhile, in the northern part of the municipality, dominant rock types include metasandstone, quartzite, phyllite, slate, dolomite, and limestone.

Various terraces and geomorphic landscapes have emerged in the valley due to the sediments. There exists diversity in sediment texture, size, and origin mode. An isolated hillock comprised of sedimentary rocks from the Siwalik Group stands within the intermontane basin, surrounded by sedimentary deposits. Stratigraphically, the lithological units of the Lesser Himalaya can be classified into three groups within the municipality: Surkhet Group, Lakharpata Group, and Dailekh Group. Similarly, sedimentary rocks from all three units of the Siwalik Group are present within the municipality. Concerning the sedimentary deposits in the Surkhet Valley, a total of six distinct units are attributed to Quaternary deposits.

Air Quality

Air pollution refers to the contamination of either the indoor or outdoor environment through chemical, physical, or biological agents that alter the natural characteristics of the atmosphere. Common sources of air pollution encompass household combustion devices, motor vehicles, industrial facilities, and forest fires. Among the pollutants that raise significant public health concerns are particulate matter, carbon monoxide, ozone, nitrogen dioxide, and sulfur dioxide. Both outdoor and indoor air pollution contribute to respiratory and other illnesses. However, it is noted that forest fires during the dry season can exacerbate air quality issues in the area, leading to reduced visibility.

The air quality at a specific location, in this case the project area, can vary from day to day, or even within hours, due to the constant movement of air. During the ESIA field survey, the air quality of the site was assessed using the Air Visual mobile app. This app gauges air quality based on two parameters: the Air Quality Index (AQI) value and Particulate Matter (PM). It categorizes air quality as good, moderate, unhealthy for sensitive groups, unhealthy, very unhealthy, and hazardous. The Air Quality Index spans from 0 to 500, where higher index values indicate greater levels of air pollution and a higher potential for negative health effects. For instance, a value exceeding 300 is classified as hazardous, while an AQI value ranging from 0 to 50 signifies good air quality, as outlined in the table below.

Table 8: Air Quality Index Value

S.N.	AQI Value	Air Quality	Remarks
1	0-50	Good	
2	50-100	Moderate	
3	101-150	Unhealthy for Sensitive groups	
4	151-200	Unhealthy	
5	201-300	Very Unhealthy	
6	301-500	Hazardous	

In a similar vein, the quality of the air is assessed based on the sizes of particulate matter present in the air, categorized as PM 1, PM 2.5, and PM 10, which are significant with respect to their impact on health. Our data collection specifically focused on the air quality regarding particulate matter PM 2.5.

PM 1: Encompasses particulate matter with an aerodynamic diameter of 1 µm or smaller.

PM 2.5: Encompasses particulate matter with an aerodynamic diameter of 2.5 µm or smaller.

PM 10: Encompasses particulate matter with an aerodynamic diameter of 10 µm or smaller.

Air quality data was gathered at three locations within the project area: the intake site and water treatment plant site, reservoir construction site and the bulk distribution pipeline. The lowest AQI value and Particulate Matter value were recorded at the intake and Water Treatment Plant Site, amounting to 32 AQI and 21.1 µg/m³, respectively. At the Amrit Dada

(RVT construction site), the AQI and PM 2.5 value stood at 37 AQI and 23.6 $\mu\text{g}/\text{m}^3$. Similarly, the air quality in Bangesimal, a location through which the bulk distribution line passes, exhibited an AQI of 46 AQI and a PM 2.5 value of 24.1 $\mu\text{g}/\text{m}^3$. Consequently, we can affirm that the air quality at the key project development sites (Intake, RVT, and Distribution Line) prior to the commencement of construction activities falls within acceptable standards.

Water Quality

On June 16, 2022, an examination of water quality was carried out to assess the condition of the Bheri River. A total of 12 parameters encompassing physical (turbidity, pH, electrical conductivity), chemical (iron, arsenic, ammonia, total hardness, calcium, residual chlorine), and microbiological (Faecal coliform) were observed in accordance with the NDWQS 2079 guidelines. The findings from the analysis indicated an elevated level of turbidity surpassing the permissible limit specified by the NDWQS. Additional information regarding the Water Quality Analysis (WQA) report concerning the Bheri River can be found in Annex.

Noise Level

Construction site noise falls under the category of neighborhood noise, encompassing noise generated from both construction sites and street activities. Construction sites contribute to noise pollution through sources like noisy machinery, vehicles, raised voices, and physical tasks such as hammering, drilling, digging etc. In Nepal, noise levels are categorized based on distinct areas during both daytime and nighttime. The Noise Level Standard of Nepal 2069 is provided in the table below.

Table 9: Noise level Standard of Nepal (2069)

S.N.	Area	Noise Level dB (A)	
		Day Time	Night Time
1	Silent Zone	50	40
2	Industrial Area	75	70
3	Business Area	65	55
4	Rural Residential Area	45	40
5	Urban Residential Area	55	45
6	Mixed Residential Area	63	40

During the ESIA field visit, noise levels were assessed at the intake and Water Treatment Plant, as well as the Amrit Dada and Bangesimal sites, using a mobile application named "sound level," specifically during the daytime. As a considerable portion of the project area is encompassed by forest, it qualifies as a quiet or silent zone. The recorded noise levels were 44 dB for the intake and water treatment plant area, 45 dB for Amrit Dada, and 55 dB for Bangesimal area. Consequently, it can be concluded that the noise levels within the project area adhere to the established standards.

4.2 Biological Environment

a. Forest and Vegetation

According to the municipality profile, Birendranagar municipality possesses abundant forest resources and a diverse range of biodiversity when compared to other municipalities in Nepal. The project area is located in the lower tropical Sal Forest and broadleaved forest zone of the western midlands of Nepal. However, due to its specific location within a valley, the vegetation is primarily characterized by riverine vegetation. This region falls into the eco-zone known as the "hill Sal Forest zone," typically found between 300m and 1000m in altitude. This zone covers most of the Siwalik Hills and their foothills in Nepal, as well as the Dun valleys, including Surkhet, which have monsoon climate.

The Hill Sal Zone is characterized by the dominance of Sal trees, along with other broadleaved species like *Terminalia*, *Anogeissus*, *Lagestroemia*, *Adina*, etc. It has the ability to regenerate quickly through coppicing and seeds, and *Shorea robusta* is a prominent species in this zone. While the Hill Sal Zone is not particularly rich in species on dry slopes and flat terraces, river gorges and ravines in this region are home to a variety of trees, shrubs, and epiphytes (Stainton 1972)¹.

In the specific areas around the project structures located in the river valley floors (300-500m in altitude), the vegetation type is representative of the lower tropical broadleaved and riverine character. Here, you can find tropical riverine forest, tropical deciduous riverine forest, and riverine Khair-Sissoo Forest, which are more commonly found in the western

¹ Stainton, J. D. A. 1972. Forests of Nepal. John Murray , London, P. 181

part of Nepal. These forests consist of major tree species such as *Sal*, *Tooni*, *Albizzia*, *Terminalia*, *Anogeissus*, *Schleichera*, *Dalbergia*, *Acacia*, among others.

The project necessitates a total forest area of 32224.8 m² (3.22 hectares), which is distributed across four community forests: Ranichautari, Shiva Shakti, Aishwarya, and Bheri community. The primary tree species present within the sub-project area are detailed in Table 10.

Table 10: Tree Detail in the Sub-Project Area

S. N	Location	Local Name	English Name	Scientific Name	Tree ²	Pole ³	Biruwa ⁴	Lathra ⁵
1	Intake	Sal	Sal	<i>Shorea robusta</i>	6			
2	Intake	Asana	Indian Laurel	<i>Terminalia tomentosa</i>	2			
3	Intake	Budghai ro	Small Flowered Crape Myrtle	<i>Lagerstroemia parviflora</i> Roxb.	3	14		
4	Intake	Dhalne Katus		<i>Castanopsis indica</i>	3			
5	Intake	Valaya	Charoli Nuts	<i>Busbanania latifolia</i>	3	5		
6	WTP	Sal	Sal	<i>Shorea robusta</i>	152	68	420	48
7	WTP	Asana	Indian Laurel	<i>Terminalia tomentosa</i>	12	3	210	122
8	WTP	Valaya	Charoli Nuts	<i>Busbanania latifolia</i>	1		28	24

² Tree: As per the Forest Resource Survey, 2004, with diameter at breast height of 29.9 inches or more

³ Pole: As per the Forest Resource Survey, 2004, with diameter of breast height range at (9.9 – 29.9) inches

⁴ Biruwa : As per the Forest Resource Survey, 2004, with height of range 1 feet – 1 meter

⁵ Lathra/Pothra: As per the Forest Resource Survey, 2004, with height of (4 - 9.9) inches

9	WTP	Dhalne Katus		<i>Castanopsis indica</i>	1			
10	WTP	Budghai ro	Small Flowered Crape Myrtle	<i>Lagerstroemia parviflora Roxb.</i>	2		70	17
11	WTP	Others			5		70	14
12	Access Road(300 m)	Sal	Sal	<i>Shorea robusta</i>	7			
13	Access Road(300 m)	Asana	Indian Laurel	<i>Terminalia tomentosa</i>	3			
14	Transmission Road, Ranichauri CFUGs	Sal	Sal	<i>Shorea robusta</i>	34	16		
15	Transmission Road, Ranichauri CFUGs	Asana	Indian Laurel	<i>Terminalia tomentosa</i>	13	6		
16	Transmission Road, Bheri CFUGs	Sal	Sal	<i>Shorea robusta</i>	129	224		
17	Transmission Road, Bheri CFUGs	Asana	Indian Laurel	<i>Terminalia tomentosa</i>	33	48		
18	Transmission Road, Bheri CFUGs	Sallo	Chir pine	<i>Pinus roxburghii,</i>	36	25		

19	Transmission Road, Shivashakti CFUGs	Sal	sal	<i>Shorea robusta</i>	134	276		
20	Transmission Road, Shivashakti CFUGs	Asana	Indian Laurel	<i>Terminalia tomentosa</i>	15	26		
21	Transmission Road, Shivashakti CFUGs	Sallo	Chir pine	<i>Pinus roxburghii,</i>	12	28		
22	RVT, Aishwarya CFUGs	Sal	Sal	<i>Shorea robusta</i>	24	107		
23	RVT, Aishwarya CFUGs	Asana	Indian Laurel	<i>Terminalia tomentosa</i>	3	4		
24	RVT, Aishwarya CFUGs	Sallo	Chir pine	<i>Pinus roxburghii,</i>	8	59		
25	Access Road, Rani Chau Tari CFUGs	Sal	sal	<i>Shorea robusta</i>	92	79		
26	Access Road, Rani Chau Tari CFUGs	Asana	Indian Laurel	<i>Terminalia tomentosa</i>		17		
27	Access Road, Rani Chau	Sallo	Chir pine	<i>Pinus roxburghii,</i>				

	Tari CFUGs							
28	Access Road, Rani Chau Tari CFUGs	Others			7	16		102
	Total				765	1021	798	327

Source: ESIA Field Survey, 2023

b. Wildlife

Surkhet district shares its boundary with Banke and Bardia districts in the Terai region, known for their tropical rainforests and diverse fauna. However, the sub-project area does not border these forest areas. The sub-project is situated within community forest areas, adjoins two municipalities with scattered settlements that have a considerable population near these community forests. These community forests also run alongside Ratna Highway, experiencing significant daily human movement and activities, and they are not the primary habitat for wild fauna.

The following is the list of mammal species present within the sub-project area, along with their conservation status based on assessments from the IUCN and IBAT reports. During the ESIA field survey, five different mammal species were reported in the sub-project area. These species are Nyauri Musa, Ban Dhade, Paanch Dharke Lokharke, Musa, and Syaal.

Table 11: Mammals in the project area

S. N.	Scientific Name	English Name	Local Name	Status
1	<i>Herpetes auropunctatus</i>	Small Indian Mongoose	Nyauri Musa	LC
2	<i>Felis chaus/Prionailurus bengalensis</i>	Jungle Cat	Ban Dhade	LC
3	<i>Funambulus pennantii</i>	Five Stripped Palm Squirrel	Paanch Dharke Lokharke	LC

4	<i>Rattus</i>	House Rat	Musa	LC
5	<i>Canis aureus</i>	Golden Jackal	Syaal	LC
Source: ESIA Field Visit Survey, 2023				
*Note: (LC= Least Concern)				

Surkhet district shares its borders with the neighboring Bardiya and Banke districts, renowned for their rich avian biodiversity. The Bardiya National Park in the lowland Terai is situated in these districts, housing over 500 bird species⁶. Many of these avian species naturally extend their habitat into the Surkhet district, highlighting the interconnectedness of the region's avian fauna.

However, it's essential to note that this sub-project location differs from Bardiya and Banke districts in two significant ways:

- **Geographic Separation:** The sub-project area is not contiguous with Bardiya and Banke districts, which are well-known for their bird habitats. As a result, it exists in a distinct ecological context.
- **Lack of a Specific Bird Habitat:** Unlike the adjoining districts, the sub-project location is not characterized as a specific bird habitat. Although it falls within the Birendranagar and Lakebesi Municipality of Surkhet district, it doesn't host a distinct bird ecosystem akin to that found in Bardiya National Park. Instead, the sub-project's vicinity primarily comprises community forests and relatively dense settlements within these municipalities.

While the sub-project area doesn't border these districts or possess a designated bird habitat, it still supports a variety of common bird species. During the ESIA field survey, local residents reported the presence of common birds within the sub-project area that are Kochalgaade Latokoshero (*Athene brama*), Kafal Pakyo (*Cuculus micropterus*), Koili (*Eudynamys scolopaceus*), Titra (*Francolinus sp.*), Rukh Bhangera (*Passer montanus*), and Dhukur (*Columbidae sp.*).

The Forest Users Committee's questionnaire survey conducted during the ESIA field assessment revealed the presence of herpetofauna (reptiles and amphibians) within the project area. Four different species of herpetofauna were reported to be found in the sub-

⁶ <https://bardianationalpark.gov.np/en/>

project area, namely; Pani Sarpa, Bhainse Gohoro, Chheparo, and Khasre Bhyaguto. The corresponding species are detailed in the provided table below.

Table 12: List of Herpito-Fauna Found in the Project Area

S. No.	Scientific Name	English Name	Local Name	Status
1	<i>Atretium schistosum</i>	Olive Keelback Water Snake	Pani Sarpa	LC
2	<i>Varanus bengalensis</i>	Common Indian Monitor	Bhainse Gohoro	LC
3	<i>Calotes versicular</i>	Garden lizard	Chheparo	LC*
4	<i>Bufo melanostictus/Duttaphrynus himalayanus</i>	Common toad/Himalayan Toad	Khasre Bhyaguto	LC

Source: ESIA Field Visit Survey, 2023

c. Aquatic Life

The Bheri River serves as a habitat for a diverse range of freshwater fish species, encompassing cold-water species like snow trout to warm-water varieties such as Mahseer. A study conducted in January 2018 during the winter season, focusing on ten selected stretches along the Bheri River, the Babai River, and their respective tributaries, as documented by Khatri et al. in 2019⁷, observed a total of 776 individuals representing 16 different species within the Bheri River and its tributaries (across five sampling sites).

However, it's important to note that the water intake structure proposed for use will not create a barrier across the river, which could obstruct the movement of aquatic life and fish. The water intake point at the river, where necessary, will be designed as a side intake structure, meaning it will be constructed along one bank of the river. There are no plans for the construction of a dam, barrage, or weir that would span the entire width of the river, which could potentially impede fish migration.

⁷ Khatri, K; Jha, BR; Gurung, S; Khadka, UR; Pokharel, S; Adhikari, A and Shreshta, AK. Fish Diversity and Distribution Status in Bheri and Babai River, Mid-Western, Nepal. Conference Proceedings, International Conference on Natural Resources, Agriculture and Society in Changing Climate, NRACC 2019, Kathmandu, Nepal, 17-19 August 2019

d. Rare, Endangered, Endemic and Threatened Species

Nepal's distinct geographical features, accompanied by diverse physiographic and climatic conditions, have led to the emergence of abundant biodiversity. The swift shifts across the environmental spectrum contribute to substantial beta diversity at the species level. Based on the ESIA field survey, there are no rare, endangered, endemic, or threatened species within the project area, encompassing both flora and fauna.

4.3 Socio-economic, Cultural and Historical Environment

Forest Users and its use

The proposed project area consists of four community forests namely Rani Chautari, Shiva Shakti, Aishwarya and Bheri Community forests. The number of beneficiaries for each of these corresponding forests are 1168, 1018, 492 and 3331 respectively. Rani Chautari Community Forest occupies highest forest area which is 579.90 ha and has 254 households, Bheri Community Forest occupies 289.50 ha and has 578 households, Shiva Shakti Community Forest occupies 204.90 ha and has 226 households, and Aishwarya Community Forest occupies 51.42 ha and has 78 households (Annual Progress Report of 2078/79 published by Divisional Forest Office, Surkhet).

The existing forest area has been utilized for gathering firewood, grass, and dry leaves. Permission has been given to collect forest produce twice a year for the users of all four community forest areas. In August-September, permission is given to cut grass, while in January-February, permission is given to collect fodders (dried leaves) and fallen tree branches for firewood.

Badi Basti

Badi Basti is positioned along the Jhupra riverbank, near the vicinity of the Ratna highway and at a distance of approximately 500 m from the point where the Jhupra and Bheri rivers meet. This community settlement is informal in nature and resides within Birendranagar Municipality Ward number 11. The predominant residents in this area belong to the Badi community, a hill Dalit community. There are also a few households from other Dalit castes like Chunara and Bishwakarma along with Janjati community like Majhi and Newar, and also Brahmin, Bharati, and Chettri who inhabit this settlement. The total households in this vicinity numbers 124, and their main source of income stems from the extraction of riverbed

materials from the Jhupra River. While no catastrophic events have been noted in the past decade according to questionnaire survey conducted with the settlement's residents, it is important to note that the location is highly susceptible to flooding due to its proximity to the Jhupra riverbank.

As indicated in the Detailed Project Report (DPR) study, an access road and transmission line for the Bheri pumping sub-project will be constructed within the Rani Chautari forest. Notably, the sub-project site, encompassing the Intake and Water Treatment Plant (WTP), is situated on the opposite bank of the Badi settlement. Consequently, the project activities are not anticipated to directly impact the settlement. Insights garnered from Focus Group Discussions (FGD) and household questionnaires within the Badi community reflect a positive outlook toward the project's construction. The community members are optimistic about potential employment opportunities once the project commences.

However, despite the lack of direct impact on the settlement from the project operations, it's crucial to acknowledge that the settlement might be influenced by air pollution and noise pollution during the construction phase, as well as due to the proposed labor camp at the WTP site. The relevant chapters delve into a discussion of these risks and their corresponding mitigation measures.

Tharubas Village

The Tharubas village, situated in Lekbesi Municipality, Ward No 9, stands as the closest settlement upstream of the proposed intake area, reachable within a 25-minute walk. With a population of 23 individuals distributed among 6 families, this village accommodates both Thakuri and Janajati households. These inhabitants are active users of the Khanddevi Community Forest but hold no association with the sub-project in the Rani Chautari Community Forest.

Residents of Tharubas are optimistic regarding the impending project's potential impact on their lives. They hold a hopeful perspective, anticipating that the proposed endeavor will yield positive outcomes without introducing any adverse effects. A particularly noteworthy benefit they highlight is the anticipated enhancement of road infrastructure connected to the project. They are confident that this road improvement will offer improved accessibility to nearby regions such as Birendranagar and Nepalgunj. In their view, this advancement is expected to facilitate the movement of goods and people, strengthen connectivity, and potentially invigorate the local economy by fostering increased trade.

Urban-oriented Communities

Bamekhola, located in Ward No. 10 of Birendranagar Municipality, is distinct in a sense that it is the most remote area within the service coverage of the Bheri pumping sub-project. It is also identified as scheme number 5 by Surkhet Upatyaka Khanepani Sansthan (Surkhet Valley Water Supply Organization).

Similarly, among the project's service areas, urban-centered communities encompass Phalante, Thauri, and Jaipur under Ward No. 2 of Birendranagar Municipality, as well as Sano Surkhet under Ward No. 10. Ward No. 11 includes Alaichour, Chowkedhunga, and Amrit Dada.

e. Population

Based on the Census of Nepal 2021, the municipality's overall population stands at approximately 153,863 individuals (Men: 75,129; Women: 78,734) and of the Lekbesi Municipality ward number 10 is around 3750 (Male: 1810 and Female: 1940). The envisaged service area encompasses 38,377 households for Birendranagar Municipality and approximately 846 households for Ward No. 10 of Lekbesi Municipality. 49% are male and 51% are female of the total population in the Birendranagar Municipality.

f. Caste/Ethnicity

The communities within the region exhibit a heterogeneous composition in terms of caste or ethnicity. Consequently, a diversity of cultures, customs, traditions, norms, and values coexist within the project area. The key informant interviews and consultations carried out for the sub-project site have further reflected the cross-section of major ethnic groups in the country.

As per the National Census Report, 2021, in a total of 38,377 households, the Barahminn and Chettri groups stand as the largest, constituting 61% of the population in the service area. The Janajati group is the second most significant, accounting for 17.6%, while the Dalit group comprises 16.9% of the total population. The remaining 4.5% pertains to various other caste groups (unspecified). A comprehensive breakdown of this information is provided in the figure below.

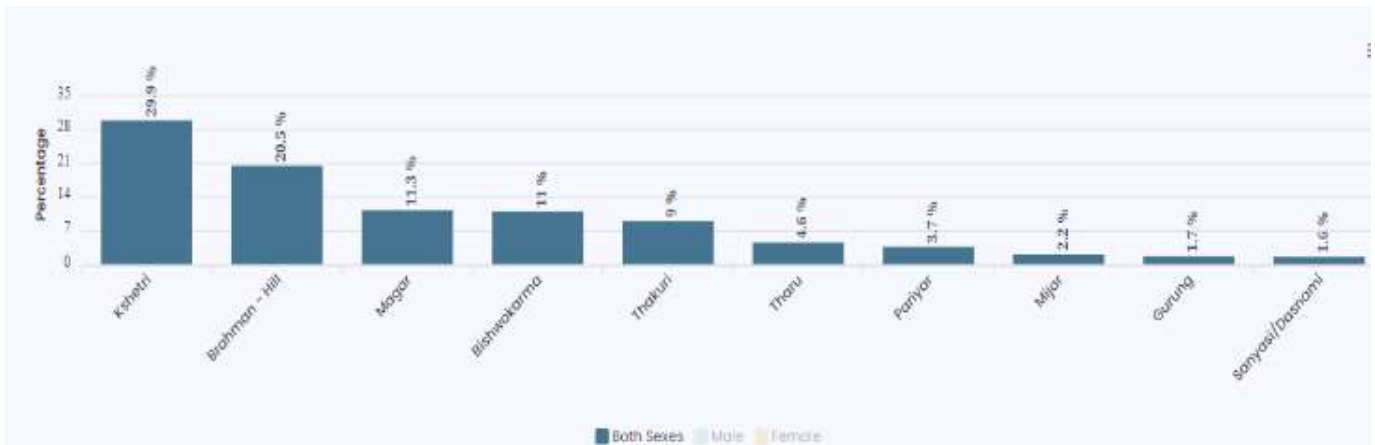


Figure 4-6: Distribution of Population by Ethnic Composition

(Source: National Census, 2021)

g. Religion

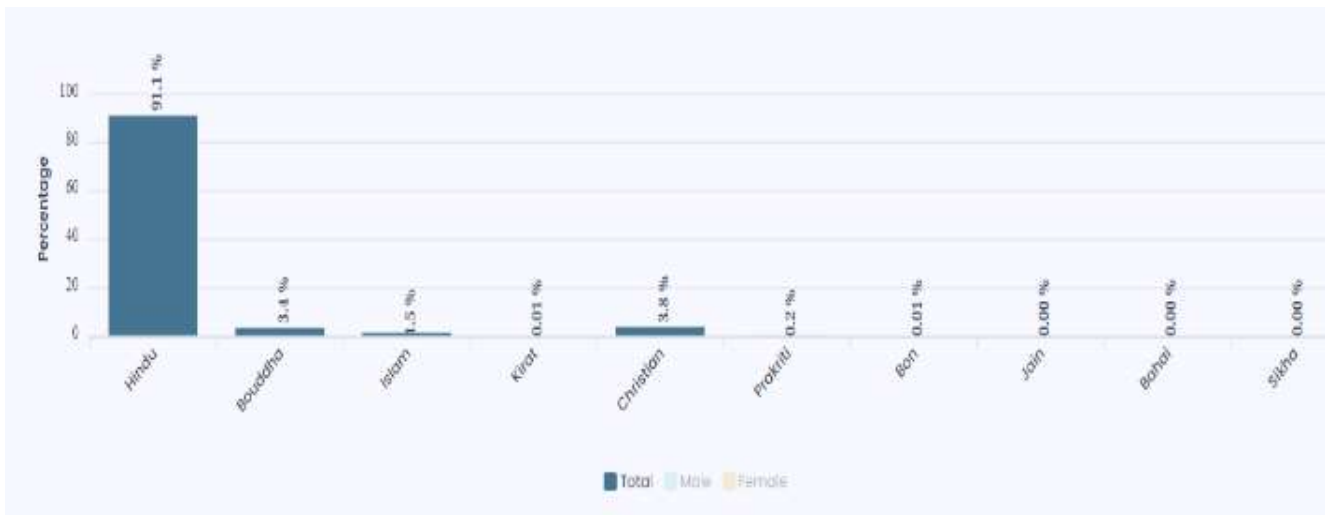


Figure 4-7: Distribution of Population by Religion

(Source: National Census, 2021)

In Birendranagar Municipality, people following Hinduism are 91.1%, followed by 3.40% following Buddhism, 3.80% following Christianity, 1.50% following Islam (1.50%), and remaining 0.2% following other religions.

h. Demographic Characteristic

The majority of individuals within Birendranagar Municipality enter into marriage between the ages of 18 and 20. More females tend to marry at an earlier age compared to males, with

this pattern beginning to decline around the age of 18 to 20. There exists a small number of individuals who marry after the age of 40. The practice of marriage typically commences when individuals reach the age of 14, as illustrated in the figure below.

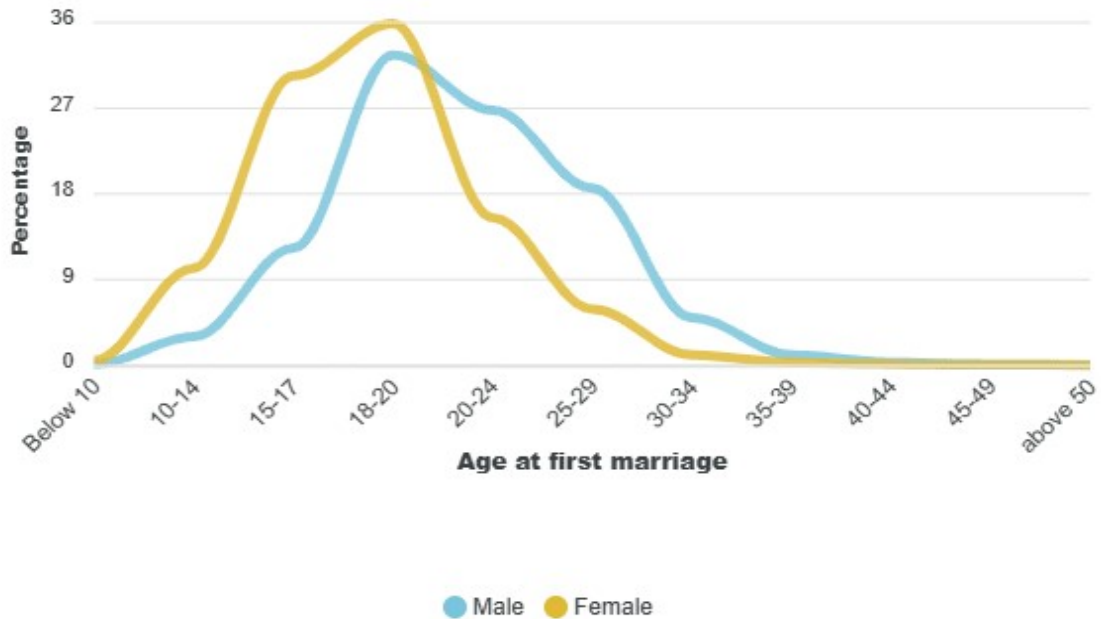


Figure 4-8: Age at first marriage

Source: National Census 2021

A greater proportion of households are headed by males across all age groups. Within the 40-49 age bracket, 16.2% of households are led by males, while in the 30-39 age group, 9.1% of households have females as the heads, as depicted in the accompanying figure.

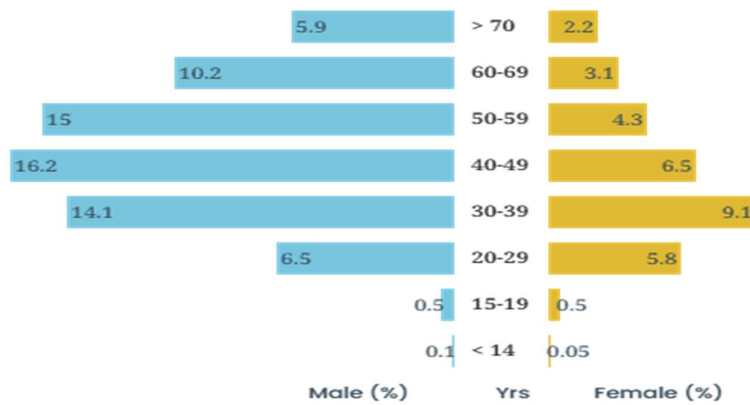


Figure 4-9: Number of household head by sex and age groups

A significant proportion of households exhibit a higher count of females compared to males and the average family size is 4.01 individuals. The distribution of households across wards is detailed in the table below, based on the National Census of 2021.

Table 13: Household distribution ward wise

Ward No	Household number	Male	Female	Total	Family structure
1	2546	5004	5204	10208	4.01
2	3573	6867	7459	14326	4.01
3	4893	9865	9754	19619	4.01
4	2550	4978	5249	10227	4.01
5	1580	3019	3317	6336	4.01
6	1918	3932	3759	7691	4.01
7	2343	4683	4714	9397	4.01
8	1951	3922	3902	7824	4.01
9	2912	5616	6062	11678	4.01
10	4511	8780	9311	18091	4.01
11	3030	5841	6310	12151	4.01
12	3581	6829	7529	14358	4.01
13	1492	2895	3087	5982	4.01
14	642	1286	1290	2576	4.01
15	388	756	801	1557	4.01
16	459	856	986	1842	4.01
Total	38377	75129	78734	153863	4.01

(Source: National Census 2021)

i. Language

The majority of people in Birendranagar Municipality speak Nepali. The officially used language is also Nepali as nearly 93% of the population speak Nepali. Similarly, 3.25 percent speak Tharu, 1.66 percent speak Maithili, 1.20 percent speak Magar, and very few people speak other languages.

j. Literacy and Educational Status

The literacy rate in the Birendranagar Municipality is 87.2 percent of the total population on average, with 92.7% of men and 82% of women being literate. According to the national census of 2021 (see figure below), 42.50 percent of the total population have studied education major, followed by 26% studying management, and 7.5% studying humanities and social science majors. 4.8% and 6.6%, respectively, of the total population have studied health/medical-science and science-and-technology majors.

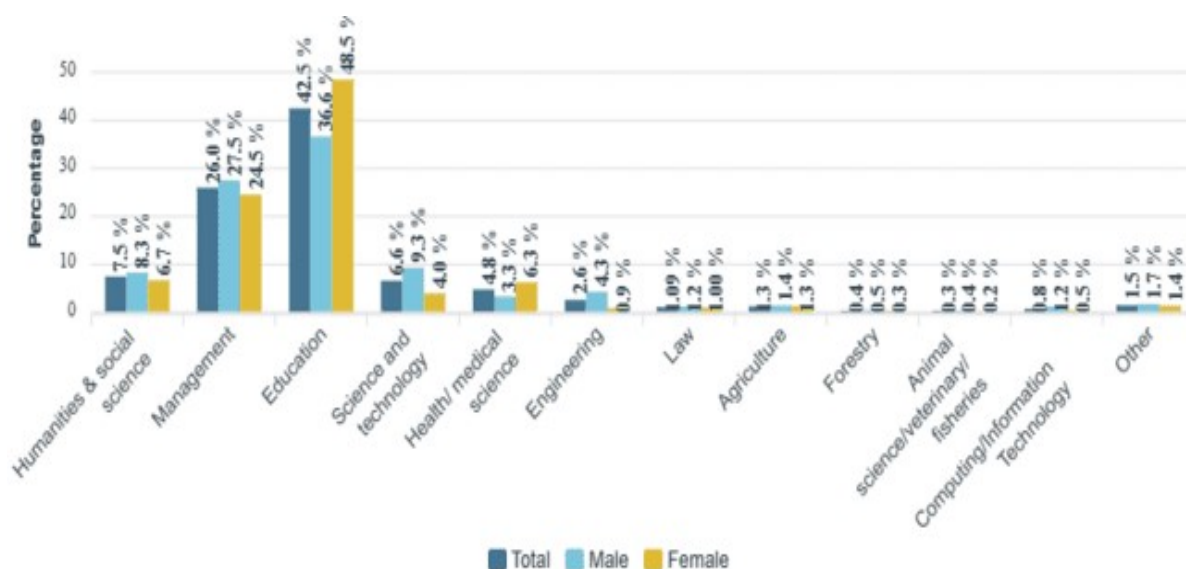


Figure 4-10: Population with 10+2 or equivalent and higher level of education by major field

(Source: National Census 2021)

Most of the people of Birendranagar municipality can read and write. However, 12.3% of total population can't read and write as shown in figure below.

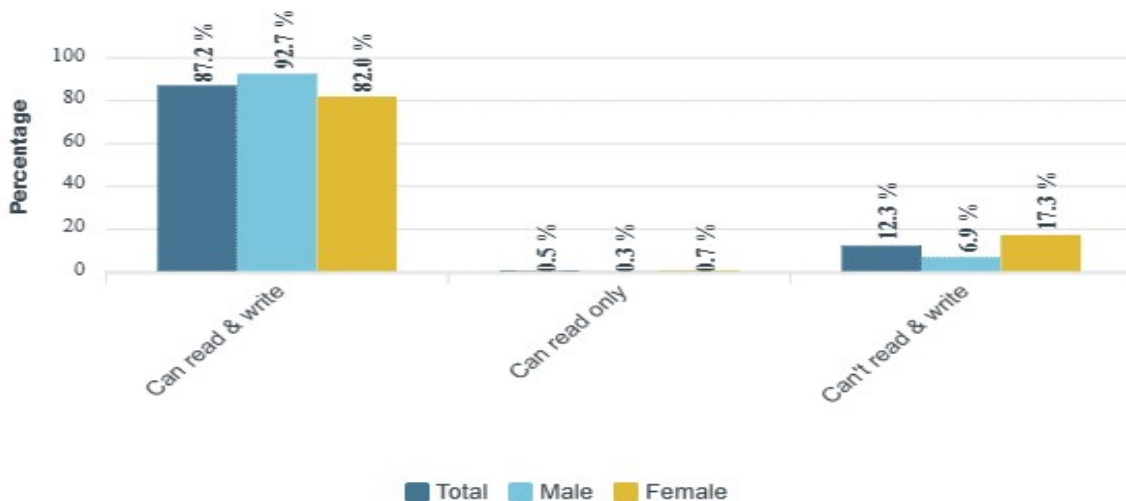


Figure 4-11: Population aged 5 years and above by literacy status and sex

(Source: National Census 2021)

The majority of people who can read and write (23.7%) in Birendranagar Municipality have finished their primary education, followed by 18.6% in lower secondary. The lowest percentage (3% of the literate population in the municipality) have earned a postgraduate degree or its equivalent. Moreover, only 4.3% of people who are literate and over the age of 5 have finished early childhood education. In the municipality, 5.6% of the entire literate population has earned a degree.

k. Occupation

Even as the local economy gradually transitions from a predominantly rural agricultural economy to one centered around trade, business, and services, the majority of households still remain dependent on agriculture. Despite being the provincial headquarters' municipality, a substantial portion of household heads are engaged in various occupations such as business and services. A considerable number of households still derive their livelihood from agricultural activities. The study indicates that the service sector employs 28.21% of the population, followed by agriculture (19.90%), business (17.68%), wage labor (17.34%), foreign employment (4.78%), industry (5%), and the remaining 3.17% in other fields. The category of wage labor encompasses both agricultural and non-agricultural laborers. Additionally, there are segments of the population who are unemployed or financially dependent. The economic status, segmented by different occupations, is depicted in the Figure 4-12.

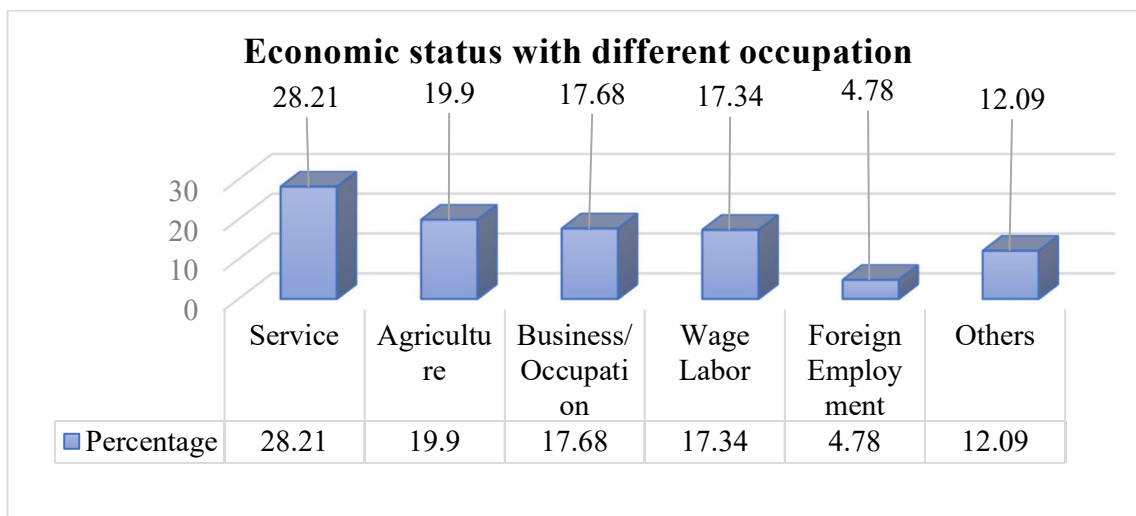


Figure 4-12: Economic status with different occupation Source: (Birendranagar Municipality Profile, 2018)

Migration can lead to fluctuations in a region's population size. Individuals move to different places in search of improved healthcare, education, and economic prospects. Based on the 2021 national census, 10.5% of Birendranagar Municipality's overall population resides in another municipality within the same district. Similarly, 37.6% of the populace lives in districts beyond their own, and 1.4% lives in foreign countries. The figure below illustrates the distribution of Birendranagar Municipality's population based on their former place of residence.

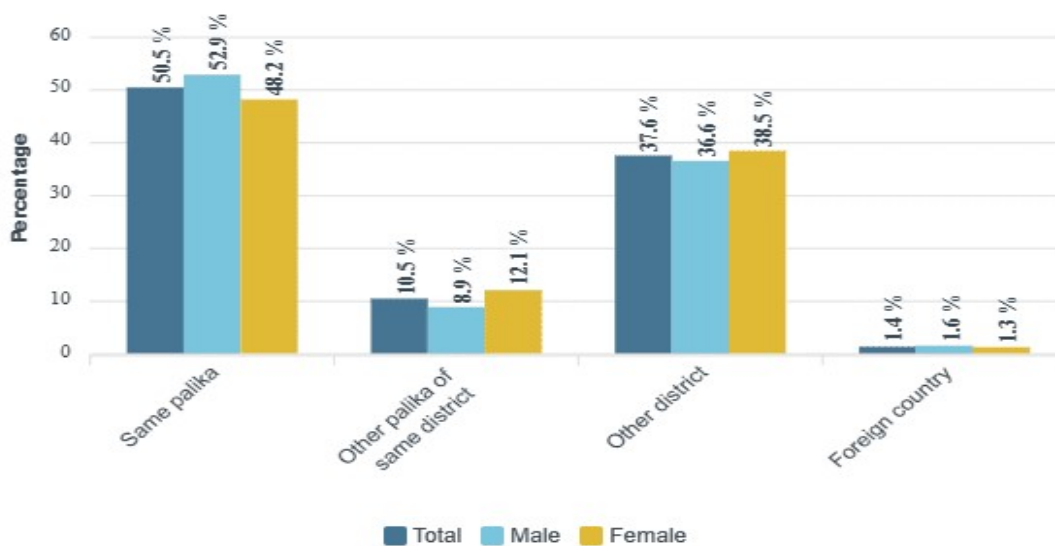


Figure 4-13: Population by former place of residence

(Source: National Census 2021)

4.4 Supply, Sanitation and Health

1. Water Supply

During the ESIA study, comprehensive information regarding the existing water supply infrastructure within the project area was gathered from the Surkhet Valley Water Supply Users' Organization (SVWSUO). The data obtained from SVWSUO revealed that, in order to address the growing demand for drinking water in Surkhet Valley, the Jhupra Brihat Khanepani Aayojana was established in 2000, subsequently being operated by the Surkhet Valley Water Supply Organization (Surkhet Upatyaka Khanepani Sanstha) since 2017. The organization is primarily reliant on water sources from the Jhupra Khola and has also integrated water from the Itaram, Khorke, and Khari-Bori Khola into its system.

Due to the increase in population and the decreasing trend of water sources, the existing system has struggled to meet the water demand adequately. Presently, Surkhet Valley Water Supply Organization is capable of providing 149 liters per second (l/s) during regular seasons, a capacity that decreases to 99 l/s during dry season. Consequently, in light of the continuously expanding population, the municipality has identified the Bheri River as a potential alternative drinking water source. The current operational scope of the organization includes servicing 20,000 households through tap connections. However, it should be noted that more than 18,000 households still lack sufficient access to drinking water, according to the organization's reports.

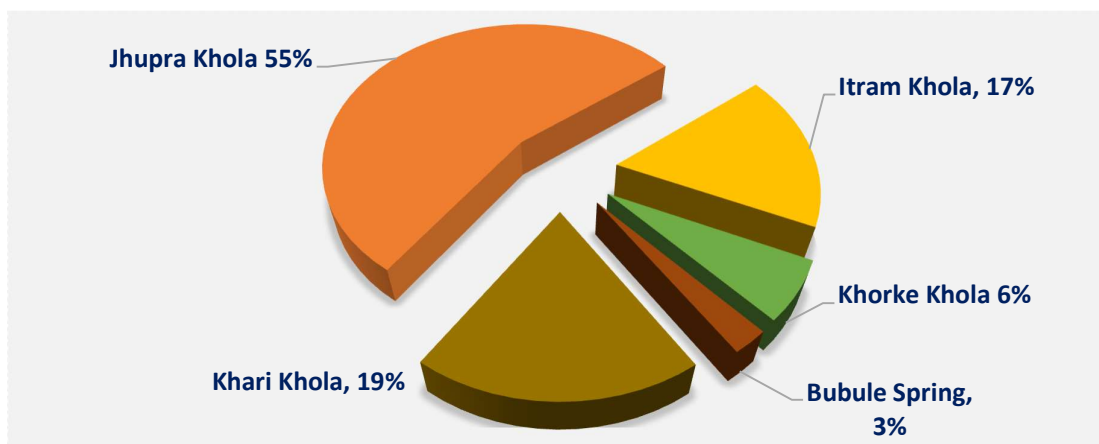


Figure 4-14: Proportion of water withdrawal from different sources in Surkhet Valley

Source: DPR report of Bheri Pumping Sub Project

m. Sanitation

a) Sanitation facilities

The primary business hub within Birendranagar Municipality is Birendranagar Bazaar, situated in Ward No. 5. A majority of households within this commercial zone possess toilet amenities. However, the provision of sanitation facilities is limited, with only 66.3% of households having access to various types of latrines, including flush latrines, regular pit latrines, and vented pit latrines. Notably, a public toilet is positioned near the bus stand along the East-West highway in the central region of Birendranagar Bazaar.

b) Drainage Facilities

The project area lacks a comprehensive municipal drainage system. Instead, stormwater drains have been constructed along roads in most settlements. These drains are primarily constructed using masonry and are left uncovered. During the monsoon season, these drains handle stormwater as well as wastewater from neighboring households, channeling them towards rivers and streams.

c) Solid Waste

Based on the study conducted within the project area, the waste composition in Birendranagar municipality is dominated by organic waste at 73.95%, followed by plastics at 11.06%, and paper and paper products at 10.15%.

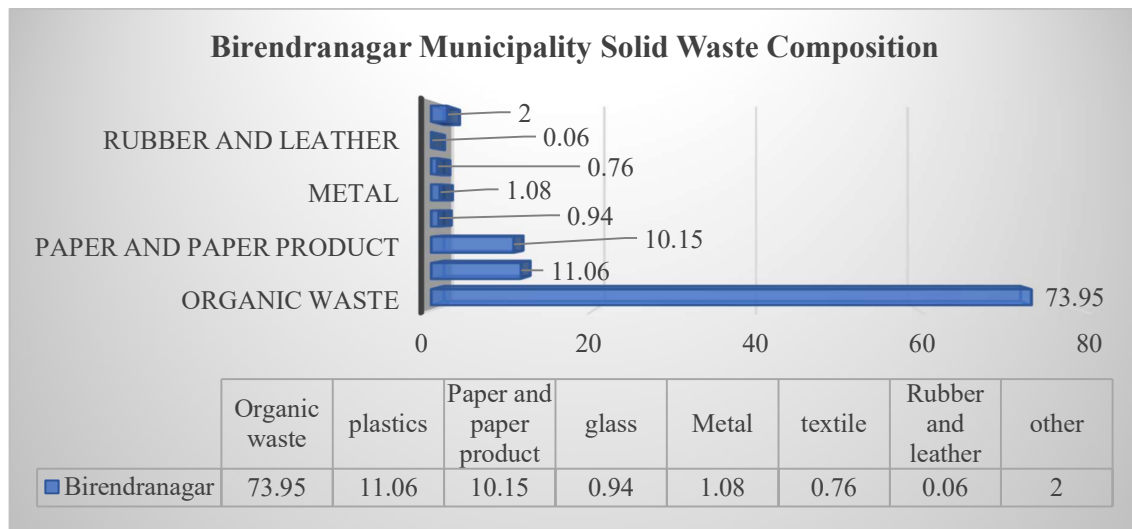


Figure 4-15: Solid Waste Composition of Project Area (Source: Birendranagar Municipality Profile, 2018)

Infrastructure

The sub-project area serves as the district headquarter of Surkhet district and holds the status of being the capital city of Karnali Province. Moreover, it functions as the primary economic hub of the province. There are a few small-scale industries, rice mills, poultry farming operating in the sub-project area at present. Additionally, the household sampling conducted during ESIA study showed that there is the presence of multiple hotels and lodges in the sub-project area, contributing to the economic vibrancy of the town.

Transportation

Birendranagar Municipality and the sub-project area are interconnected with other regions of the country through Ratna highway. This highway establishes a link between the municipality and the east-west highway at Kohalpur in Banke district. Another significant route is the Karnali highway, connecting the municipality with various districts within Karnali Province, including Dailekh, Kalikot, Jumla, and Mugu. Additionally, the subproject sites are accessible through an access road that connects to different villages within Lakebesi Municipality's Ward no. 10.

To access the Intake and Water Treatment Plant (WTP), the designated route is via the concrete bridge at Bhangari, with its purpose being to connect the village of Lakebesi Municipality with the Ratna Highway. This bridge is situated approximately 2.3 km upstream from the confluence of the Bheri and Jhupra rivers. According to information from the Federal Road Supervision and Monitoring Office in Surkhet, construction of the Bhangari bridge has been recently completed.

Furthermore, within the Lakebesi Municipality section, an earth road has been established to facilitate travel to Simdamar, Rupse village, and Gangate Bazar in Lakebesi Municipality Ward No. 9 (Section B in Figure 4-16), as indicated in the provided figure. This road connects to an existing 5-meter-wide road, forming a crucial part of the access route.

At the end of section B, there exists a 900-meter-long foot trail that needs to be upgraded into an access road (Section C in Figure 4-16). The current foot trail spans 1 meter in width and serves as a transportation route for nearby communities in Lakebesi Municipality, facilitating the movement and collection of Non-Timber Forest Products (NTFPs). Following sections C and D, an existing 5-meter-wide road is present (Section E in Figure 4-16).



Figure 4-16: Map showing Access Roads

According to Lakebesi Municipality, they have a pre-existing plan to upgrade the foot trail (Sections C, D, and E in Figure 4-16) to establish a connection between Tharubas village and the road network. During the preparation of this study, it was observed that a substantial number of trees would need to be cleared in Section C in Figure 4-16. Tharubas village is located approximately 2 km away from the Treatment Plant and Intake sites. However, the municipality has a plan to either construct or elevate the road to an earth road standard. The upgradation of this earth road must meet project specifications, a task that falls under the responsibility of the Bulk Distribution System contractor of Package 1.

The project intends to utilize the road for access, incorporating the necessary upgrades. The improvements will be made only in the roadway pavement, obviating the need for land acquisition or forest clearance. According to the municipality's provided details, the construction and upgrades are anticipated to be completed by September 15, 2024.

Birendranagar Airport serves as a major transportation hub in Province 6, facilitating connectivity to remote regions across the country, including Jumla, Humla, Kalikot, Mugu, and Dolpa. The airport runway boasts a paved surface and spans a length of 4118 ft.

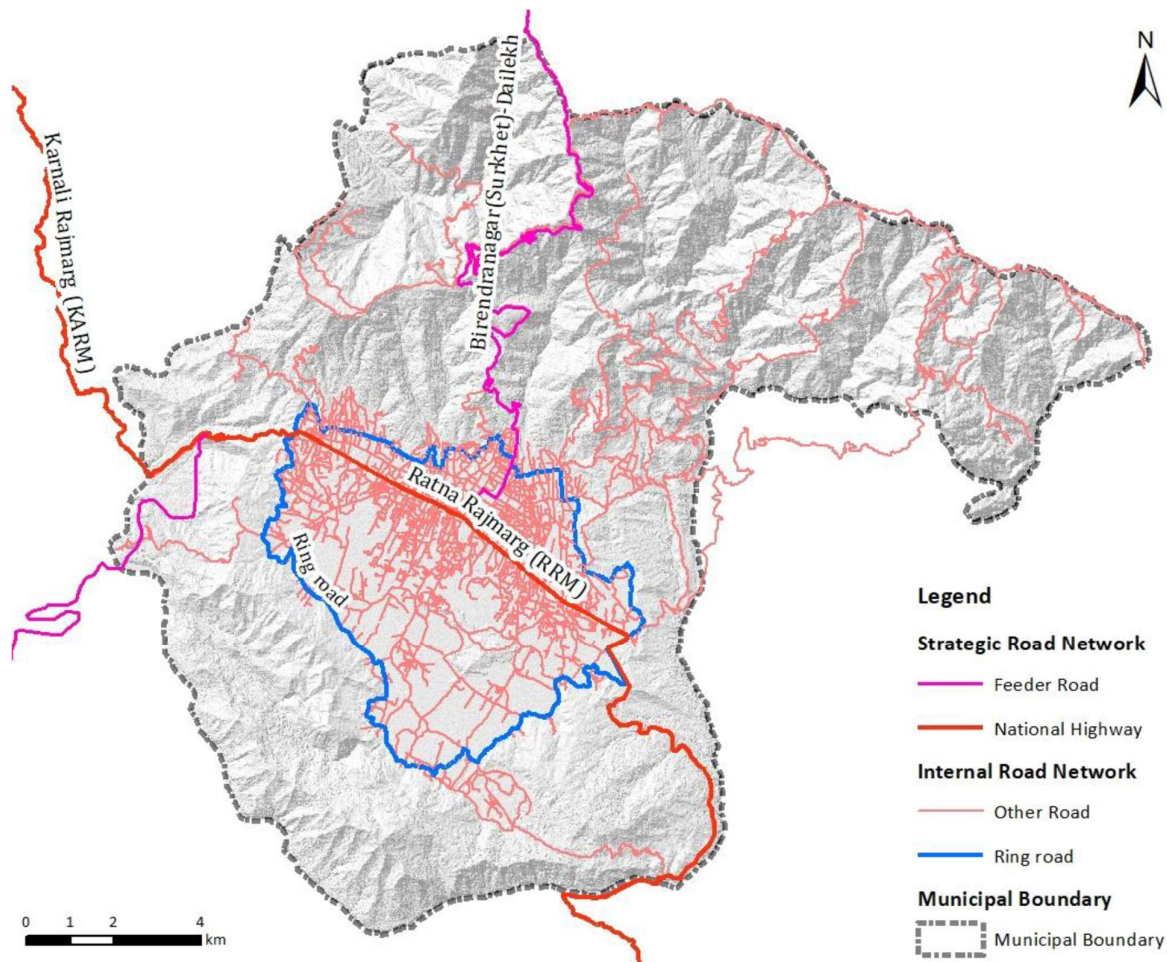


Figure 4-17: Internal Road in Birendranagar Municipality

(Source: Multi-hazard Profile Birendranagar)

Communication

Birendranagar is considered one of the major urban hubs within the vicinity. The city features domestic air travel connectivity to and from Kathmandu, Jumla, Kalikot, Mugu, and Dolpa via its domestic airport, located to the east of the city. For travelers who prefer terrestrial transport, a reliable bus service links Birendranagar with destinations such as Kathmandu, Bharatpur, Pokhara, and Dharan.

In terms of media presence, Birendranagar hosts a regional station of Radio Nepal, broadcasting a diverse array of programs catering to the masses. Additionally, the city is home to local FM radio stations, including Radio Bheri at 102.7 MHz, Radio Surkhet at 90.2 MHz, Jagaran F.M. at 90.8 MHz, and Bulbule F.M. at 103.4 MHz. Local television channels, namely Sungava and Samabeshi, also contribute to the city's media landscape.

Health Services

Birendranagar serves as the main hub for education and healthcare in Nepal's West Hilly Region, home to numerous colleges, schools, and a variety of medical facilities including a district hospital, regional hospital, and several private hospitals, nursing homes, and clinics.

The recently constructed provincial hospital is currently operational with 125 beds, but its capacity is expected to expand to over 500 beds in the near future. This hospital is expected to offer cutting-edge lab services to not only Birendranagar's residents but also to the wider Karnali region of Nepal. Among Birendranagar's oldest healthcare institutions, the district hospital, with 35 beds, offers medical services to the locals. Additionally, the Midwestern Region Veterinary Hospital in Birendranagar ensures comprehensive medical care for the livestock belonging to neighboring farmers in Nepal's Midwestern region.

Settlement Pattern

Birendranagar Municipality is undergoing rapid urbanization, driven by substantial migration from neighboring rural municipalities in pursuit of improved quality of life and opportunities. It holds significant socio-economic and administrative importance, serving as a crucial gateway to the Karnali zone. However, the urban development in the area has been haphazard, attributed to the absence of urban plans and policies, as well as weak enforcement of existing plans.

The settlement pattern within the project area is diverse. Nonetheless, there is a gradual shift occurring in this pattern towards urban-oriented communities, including Phalante, Thauri, Jaipur in Ward No. 2, Sano Surkhet in Ward No. 10, and Alaichour, Chowkedhunga, and Amrit Danda in Ward No. 11. Over recent years, the rate of migration into the service area from nearby villages and other districts has been on the rise. Birendranagar municipality as the capital of Karnali province functions as a significant market for the surrounding rural communities.

Religious, Historical and Archaeological Sites

In the vicinity, there exists a Hindu temple known as Deuti Bajai which is distinct as it is a national heritage site associated with the Raji society. Similarly, the area also boasts the presence of a Hindu-Buddhist temple named Kakre Bihar, dating back to the 12th century, which holds archaeological significance and was originally crafted by Indian artisans.

Adjacent to the city's southern region lies the Mangal Gadhimai, Hindu site along with a pond, as well as barrack of the Nepal Army. Additionally, a Shiva Mandir stands near the Nepal Telecom tower in Amrit Danda, which was constructed by the local community.

Water Use

As per the Surkhet Valley Water Supply Users' Organization, the present distribution of water in Birendranagar involves the utilization of water from the Jhupra, Kharibori, Itram, Khorke, and Bulbule rivers. The current supply stands at a mere 79 liters per second from these rivers, falling far short of the demand of 320 liters per second in Birendranagar. The water level is even lower during the dry season. The National Census of 2021 reveals that Birendranagar is home to approximately 35,000 households, but the Surkhet Valley Water Supply Users' Organization indicates that only 20,000 households are currently connected to the water supply. (Shahi, 2023)

As indicated by the National Census of 2021, within Birendranagar Municipality, 51.90% and 19% of households have access to piped or tapped water within and outside their compounds, respectively. Likewise, 12.3% and 6.4% of households primarily rely on covered and uncovered wells, or kuwa, for their drinking water needs. Furthermore, 5.2% of households utilize spout water, 2.9% depend on tube wells or hand pumps, 1.03% use jar or bottled water, 0.2% obtain water from rivers and streams, and 1.01% rely on other sources for their drinking water.

Land Management: Usage and Ownership Patterns

This is one of the major indicators used to find out the economic status of a household within the community. Consequently, the evaluation of land ownership status and its associated patterns has been conducted using the data from the National Census 2021, conducted by the Central Bureau of Statistics Nepal. The survey indicates that approximately 66% (19,237) of households possess their own land, while 34% (5,395) have homes without land ownership, including a small number with unspecified status. The distribution of land ownership status across different wards is illustrated in the figure provided below.

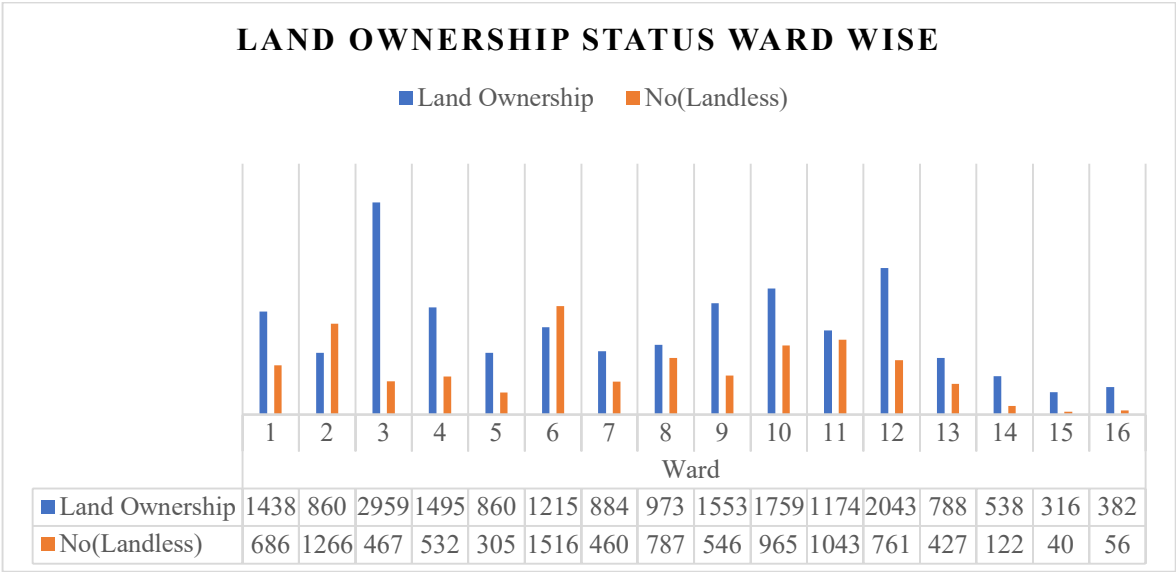


Figure 4-18: Status of Land Ownership in Service Area

(Source: National Census, 2021)

CHAPTER 5

Stakeholder Engagement and Information Disclosure

5.1 Introduction

Stakeholder engagement is integral for the preparation of ESIA along with garnering inputs for preparing the Environment and Social Management Plan (ESMP) as well as the overall project design and its implementation. The overall objective of such activities is to provide means for effective and inclusive engagement with project-affected parties throughout the project life cycle on issues that could potentially affect them. Effective stakeholder engagement ensures that appropriate project information on environmental and social risks and impacts is disclosed to stakeholders in a timely, understandable, accessible and appropriate manner and format, and provide all concerned stakeholders with the opportunity to raise any concerns with specific reference to the project's planned interventions.

During ESIA for Bheri Pumping Sub-Project, consultation meetings were organized basically for two important purpose: (1) to share project objectives and proposed project interventions with the identified stakeholder groups and (2) to consult with the stakeholders and document their concerns in general and in particular reference to social and environmental impacts of the proposed project interventions. During the field assessment, community consultations were integral to the project's social and environmental assessment process.

Public participation is a continuous two-way process, i.e., developing people's understanding of the project, activities, and process of ESIA, and capturing their opinion on expected environmental and social concerns/issues. In order to understand the anticipated project benefits/risks and people's perceptions of the project, the team conducted field visits to different places within and outside the project footprint area.

While preparing the Environmental and Social Impact Assessment (ESIA), the stakeholder consultation process involved consultations with various stakeholders at various stages to gather their inputs and document their concerns. These included residents of the community who may be affected by the project, officials and members of the four community forests housing the project footprints, representatives of Dalit and marginalized groups, members of various schemes under the existing water supply project, and various non-governmental

organizations working in Birendranagar Municipality. Apart from this, line agencies of the local Government (such as relevant departments or ministries) also participated as observers in such consultations. This process enabled establishment of a communication channel between the general public and the team of consultants, and between the project proponents and the Government. The concerns of the stakeholders were then made known to the decision-making bodies.

5.2 Stakeholder Consultation and Engagement during the Preparation of ESIA

To prepare ESIA, the PIU of Birendranagar Municipality took responsibility for coordinating consultative meetings with various stakeholders. In order to inform the relevant stakeholders, public announcements were broadcast through mobile SMS. PIU also made telephone/mobile calls to stakeholders like the forest user groups and representatives of non-government and community-based organizations. In addition, the Feminist Dalit Organization (FEDO), CFUGs, WASH related organizations, government line agencies and some project affected families were involved in coordinating these activities to ensure that the communities were notified. Consultation meetings were held at various locations with the concerned stakeholders and these stakeholders include the following personnel, groups, and organizations.

- Women, Dalit, indigenous, marginalized and vulnerable people of the project area
- Representatives of various water schemes (an area where water is distributed from an existing reservoir is referred to as a scheme) under existing water supply system
- Officials and members of the four community forests housing the project footprint
- Representatives of local non-governmental organizations
- Journalists
- Residents from Amrita Dada and Jhupra Community
- Representatives of Community-Based Organizations, i.e., Mothers' Group, Youth Clubs

During stakeholder engagement, the ESIA team deliberated on several key aspects, encompassing the construction sites for the Bheri Pumping sub-project, potential environmental and social repercussions, corresponding mitigation strategies, the project's geographical scope, and the anticipated advantages for the nearby inhabitants. The team also deliberated on the grievance redress mechanism. These issues were presented using a

PowerPoint (PPT) presentation where feasible, and in instances where visual aids were not possible, verbal presentations were made.

5.3 Stakeholder Engagement Methods and Stakeholder Engagement Summary

The consultation process envisages all stakeholders' involvement at each subproject planning and implementation stage. The participation of the community was not just limited to interactions with the community but also disclosing of relevant information pertaining to the project and its implementation procedures in a timely, accessible and appropriate manner and format. Notwithstanding a series of field visits, stakeholder engagement activities were carried out through several methods to extract opinions, concerns, and interests of people and community organizations from varied backgrounds. The stakeholder engagement activities were organized using the following methods:

- Formal public meetings (at pre-designated venues)
- Focus Group Discussions (FGDs)
- Key Informant Interviews (KIIs)
- Face-to-face meetings

The details of stakeholders and the engagement activities and the engagement summary are provided in table number 14 and 15 respectively. For details of the concerns raised by different stakeholders and the responses provided by the team, please refer Annex 4 of this report. The list of attendance of different stakeholder consultations is shown in Annex 10.

Table 14: Summary of Stakeholder Consultation

S.N.	Stakeholders	Venue and Date	Engagement Method	Number of Participants		
				Male	Female	Total
1.	Dalit CBOs/Media/ Human rights organization (list the names)	FEDO office, Birendranagar 23 rd May, 2023	FGD	4	16	20
2.	NGOs working in WASH (list the names)	Municipality Hall, Birendranagar 23 rd May 2023	Formal meeting public	20	4	24
3.	Community from Amrit Danda and	Amrit Danda 26 May, 2023	Formal meeting public	20	19	39

	Aishwarya Community Forest User Groups					
4.	Shivashakti Community Forest User Groups	Shivashakti Community Forest Area 26 May, 2023	FGD	1	5	6
5.	Bheri Community Forest User Groups	Bheri Community Forest Area 26 May, 2023	FGD	7	6	13
6.	Ranichautari Community Forest User Group	Office of Ranichautari Community Forest Users Group, Lekbesi-10 27 May, 2023	FGD	5	1	6
7.	Surkhet Valley Water Supply Group (Scheme 1 and 3)	Surkhet Valley Water Supply Association Scheme No 1 and 3 public places Birendranagar, Itram 27 May, 2023	FGD	6	4	10
8.	Key Informants	May 25-27, 2023	KIIs	3	3	6
9.	Community in Tharubas	Tharubas Village Date: 28 May, 2023	FGD	2	2	4
10.	Jhupra Settlement	Jhupra Community Date: 28 May, 2023	FGDs	3	4	7

Table 15: Summary of Stakeholder Engagement Activities

Stakeholder	Concerns/issues raised
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Dalit CBOs, Media groups, Human Right Groups	<ul style="list-style-type: none"> • Discrimination in public water sources • Employment opportunities • Household piped water connection
NGOs working in WASH	<ul style="list-style-type: none"> • Disaster Risk Reduction plan in place • Provision of fire hydrants in WTP • Reliability of post-construction testing to avoid leakage and destruction • Integrated approach to infrastructure development • Transparency in project activities and information disclosure • Response to immediate water needs of the valley
Amrit Danda Residents and Aishwarya Community Forest User Groups	<ul style="list-style-type: none"> • Marginal land holders should not be displaced in the name of infrastructure development • Employment of local people • Labour camp should be well managed • The powerful should not tinker with the original project design so as to impact marginal land holders
Shivashakti Community Forestry User Groups	<ul style="list-style-type: none"> • Cost of stockpiling of felled trees should be provided to the user groups • Aid with recharge pools • Assist in promotion of tourism and aid in small infrastructure like toilets and well-built drinking water taps
Ranichautari Community Forestry User Groups	<ul style="list-style-type: none"> • Provide development benefits to this community forestry group and community even though it is not a direct beneficiary of the project. • Make public the agreements done with erstwhile community forestry user working committee
Surkhet Valley Water Supply Association (Scheme 1 and 3)	<ul style="list-style-type: none"> • Sustainability of the project through fair and inclusive tariff system • Provide safe and clean drinking water • Establishment of a grievance system that is easily accessible for marginalized and disadvantaged communities
Surkhet Valley Water Supply Organization Personnel	<ul style="list-style-type: none"> • Bheri Pumping sub-project to fulfill the chronic water shortage in the valley as a significant project • Water users must be trained to operate and maintain the project. • Prudent labour camp management should be in place • Tree felling for the project should be judicious
KIIs	<ul style="list-style-type: none"> • Ensure safe water supply • Provide employment opportunities for disadvantaged women during project construction and implementation • Provision of water tariff concessions to single female-headed households with low income • Pollution prevention measures should be adopted from the beginning • Construction of public toilets in Community Forest area
Tharubas Community	<ul style="list-style-type: none"> • Hopeful to get employment due to implementation of the project • Project's road connection will boost local economy, enhance connectivity, and promote business growth

Jhupra Community	<ul style="list-style-type: none"> • Hopeful to get employment during the construction and operation of the project
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5.4. Future Stakeholder Consultation and Information Disclosure

Future stakeholder engagement activities for the sub-project is guided by the SEP prepared for the WaSGISP project. This sub-project level SEP is prepared to promote timely and accessible disclosure of relevant information to project stakeholders, guide meaningful consultation with local communities and enable constructive dialogue among different stakeholders. As a part of project preparation, the PMU and PIU have identified key stakeholders who will be directly or indirectly affected by the project; carried out preliminary engagement with some of these stakeholders and outlined ways by which they can share information with stakeholders, consult them in a meaningful way, and enable stakeholder participation and feedback to project implementation process. For details, please refer to the SEP of WaSGISP.

5.5 Stakeholder Engagement Plan

In keeping with the expectations of the stakeholders, the project will undertake regular engagement with the key stakeholder groups that have been identified. Based on the previous engagement activities and the profile of the stakeholders thus identified, certain engagement activities have been identified for the project going forward. The primary objective of these engagement activities is to allow for the stakeholders to interact with the project and to keep them updated on the project progress and issues that may have a bearing on them. However, what is acknowledged is that the since SEP is a live document, the engagement activities proposed; their frequency; location and modus operandi will be updated as required, based on the monitoring process and feedback of the stakeholders; throughout the implementation phase. The table below provides the engagement activities that have been identified for the project prior to the implementation phase and during the implementation phase.

Table 16: Stakeholder Engagement Plan

Topic	Stakeholders	Engagement Method	Frequency/Time	Responsibility
Before Construction				

<p>At the Federal and Provincial Level</p> <ul style="list-style-type: none"> ▪ Planned activities of the project ▪ E&S principles including ESMF ▪ IEE/ESIA disclosure ▪ Disclosure of Stakeholder Engagement Plan ▪ Cultural Heritage procedures ▪ Disclosure of SEA/SH Action Plan ▪ GRM ▪ Citizen Engagement Activities 	<ul style="list-style-type: none"> ▪ Federal government line agencies ▪ Provincial Government line agencies 	<ul style="list-style-type: none"> ▪ Official Letters ▪ Face to face meetings, orientations and trainings ▪ Emails 	<p>Periodically throughout sub- project implementation</p>	<p>PMU/PST at the federal level</p> <p>PIU/MST at the provincial level</p>
<p>At the Local Level</p> <ul style="list-style-type: none"> ▪ Planned activities of the project including location of project footprints ▪ E&S principles including ESMF ▪ IEE/ESIA disclosure ▪ Disclosure of Stakeholder Engagement Plan ▪ Disclosure of SEA/SH Action Plan ▪ GRM ▪ Citizen Engagement Activities 	<ul style="list-style-type: none"> ▪ Birendranagar Municipality and concerned officials ▪ Surkhet Valley Water Supply Association ▪ Community Forestry User Groups ▪ Local CBOs/NGOs and media ▪ Local community ▪ Women and vulnerable communities 	<ul style="list-style-type: none"> ▪ FGDs and targeted outreach activities with women, IP organizations and other vulnerable groups, such as Dalits, people with disabilities etc. (Application of audio/visual communication techniques, and other accessible formats) ▪ Community radio and local media ▪ Municipality and project websites ▪ Face to face meetings ▪ Periodic information disclosure activities 	<p>Periodically throughout sub-project implementation.</p>	<p>PIU/MST</p>
<ul style="list-style-type: none"> ▪ Orientation and training on SEA/SH issues and risks and response ▪ Disclosure of SEA/SH action plan 	<ul style="list-style-type: none"> ▪ Women and vulnerable communities in Amrit Danda and Jhupra community 	<ul style="list-style-type: none"> ▪ Targeted outreach program including workshops 	<p>Throughout sub-project implementation</p>	<p>PIU/MST</p>
During Construction				
<ul style="list-style-type: none"> ▪ Disclosure of ESMP (and updated ESMP), including C-ESMP (including chance find procedures and cultural heritage) ▪ Delineate Labour Influx Management 	<ul style="list-style-type: none"> ▪ Birendranagar Municipality and concerned officials ▪ Surkhet Valley Water Supply Association ▪ Community Forestry User Groups 	<ul style="list-style-type: none"> ▪ FGDs and targeted outreach activities with women, IP organizations and other vulnerable groups, such as Dalits (Application of audio/visual communication techniques, and 	<p>Periodically throughout project implementation</p>	<p>PIU/MST Contractors</p>

Procedures explicitly ▪ Community infrastructures planned	▪ Local CBOs/NGOs and media ▪ Local community ▪ Women and vulnerable communities	other accessible formats) ▪ Community radio and local media ▪ Periodic information disclosure activities		
▪ Beneficiary satisfaction survey	▪ Target beneficiaries of the project	▪ Beneficiary satisfaction survey	First survey after two years of implementation and last survey during the final year of operation	PMU/PST/MST

5.6 Proposed Strategy for Information Disclosure

All relevant documents of the project, including the ESMF, ESIA, IEE, C-ESMP, ESCP among others, will be disclosed and made accessible to all stakeholders. The information will be disclosed through all possible means, ranging from face-to-face consultations with the project stakeholders, distribution of hard copies, posters, leaflets, and brochures, through community radios, social media, PMU and PIU websites so that the documents and information are accessible to all project stakeholders of the project.

Table 17: Proposed Strategy for Information Disclosure

Target stakeholders	List of information to be disclosed	Methods and timing proposed activities
Project implementation phase		
<ul style="list-style-type: none"> Government officials (Federal, provincial, Municipality officials including the wards) District line agencies 	<ul style="list-style-type: none"> Planned and ongoing activities Regular updates on project status including the implementation of ESIA, ESMP, C-ESMP GRM SEA/SH Action Plan 	<ul style="list-style-type: none"> Sharing project update and reports through meetings Consultation and face to face meetings Information boards, leaflets, and brochures PMU/PIU websites
<ul style="list-style-type: none"> CBOs and NGOs working on WASH Local NGOs and CBOs Community leaders National & local Media 	<ul style="list-style-type: none"> Project concept and planned activities ESMF, ESIA, IEE, ESCP SEA/SH Action plan GRM process SEA/SH Action plan 	<ul style="list-style-type: none"> Information boards, leaflets, and brochures PMU/PIU websites Meetings and workshops
<ul style="list-style-type: none"> Individuals and communities with a focus on vulnerable groups, including, IPs, women, and Dalits Community Forest User Groups Surkhet Valley Water Supply Association 	<ul style="list-style-type: none"> Project concept and activities E&S procedures and management plans Updated SEP, GRM procedures, ESMF and ESCP, and Revised project information 	<ul style="list-style-type: none"> Regular release of public notices through mass media, community radio, television, and social media Regular updates of information on the PMU/PIU website Distribute information leaflets and brochures to public

<ul style="list-style-type: none"> Local NGOs and CSOs 		<ul style="list-style-type: none"> Air project information/ messages through community radio Periodic small group meetings with vulnerable and IP groups Regular contacts with the representatives of IP and vulnerable groups through phone calls, emails, text messages (Application of audio/visual communication techniques, and other accessible formats)
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5.7 Reporting Feedback

Enabling stakeholders to understand whether the feedback they have provided during consultations has been received and considered during engagement activities, and conducting in-depth consultations are important factors to build trust with the community. Reporting back to stakeholders helps demonstrate that the project seriously takes into consideration the suggestions, comments and complaints raised by the local community, and if/how these have been incorporated and addressed. Understanding stakeholder concerns and addressing these early on in the project planning and before implementation can help to avoid any project issues during implementation and can help to secure consensus for the project from key stakeholders. The project will adopt the following mechanisms to manage stakeholder feedback and comments, and to report back to the stakeholders:

- The project will ensure that feedback and comments received through comment boxes, online platforms in the social media, project email, and dedicated telephone numbers are acknowledged by registering them in a logbook and will be addressed in an appropriate and timely manner.
- A periodic review of the implementation of the sub-project level SEP will continue to incorporate new issues that have come to light, and concerns and queries raised by the stakeholders during the project implementation. It will also provide information on how the feedback has been considered and addressed by the project.

5.8 Grievance Redressal Mechanism (GRM) System

A Grievance Redressal Mechanism (GRM) to address issues and grievances of project beneficiaries and stakeholders through a transparent and culturally appropriate process has also been established for the Bheri Pumping sub-project. The project's GRM is provided free

of charge for complainants and assures that those who raise concerns about project activities will not face any form of retaliation. Furthermore, the grievance mechanism shall not impede access to legal or administrative remedies.

Objectives of the GRM

The objectives of the GRM are;

- Establish channels for affected individuals to report complaints or address disputes throughout the project's lifespan.
- Ensure the identification and implementation of suitable redress actions that satisfy complainants' concerns.
- Minimize the reliance on legal proceedings whenever feasible.
- For indigenous and vulnerable population, utilize culturally fitting and easily accessible methods for them to submit complaints and seek redress through customary dispute resolution mechanisms.

Grievance implementation procedure

The project will create a grievance procedure/manual through collaboration with project-affected parties and stakeholders, which will encompass the following steps:

- Establish methods for informing and educating stakeholders about GRM procedures.
- Receive, record, and acknowledge grievances.
- Examine and investigate the grievance.
- Formulate a resolution or elevate the grievance.
- Provide feedback on the grievance.
- Execute, oversee, and assess the functionality of the GRM.

Procedure of Grievance Redressal Mechanism (GRM) System

The primary objective of this system is to establish a dependable and transparent procedure that includes a step-by-step resolution process designed to promptly handle complaints. If the complainant is dissatisfied with the resolution provided at the initial level or if a resolution cannot be provided within a specified timeframe, a higher level of resolution is initiated. The SEP prepared for WaSGISP introduces a two-tiered Grievance Resolution Mechanism.

Tier 1: This level operates from project locations within the participating municipalities and acts as the initial point of contact for all project-related complaints. Once a grievance is registered, it enters the Tier 1 of the GRM system. The Tier 1 GRM committee is headed by the PIU chief located in the partner municipalities. The deputy Mayor of Birendranagar Municipality is the Advisor of this committee. The Tier 1 GRM Committee may seek assistance from the Local Level Judiciary Committee if required.

Tier 2: In cases where the complainant rejects the resolution provided at Tier 1 or if the Tier 1 GRM Committee is unable to reach a resolution within the specified timeframe, the grievance will escalate to Tier 2 of the GRM system. The Tier 2 GRM committee, located at the Project Management Unit (PMU) of the Department of Water Supply and Sewerage Management (DWSSM), will be led by the chief of the PMU. It will receive support from the Social Development Specialist at the PMU and another individual designated by the PMU's head. This three-member committee has the authority to seek assistance from other experts or institutions as needed during the process of investigating and resolving complaints.

If the complainants are dissatisfied with or decline the resolution offered by the Tier 3 GRM, they will be recommended to pursue redress through the judicial system or any other formal avenues that may be accessible.

The Illustrative description of the GRM procedure is given in Figure 5-1.

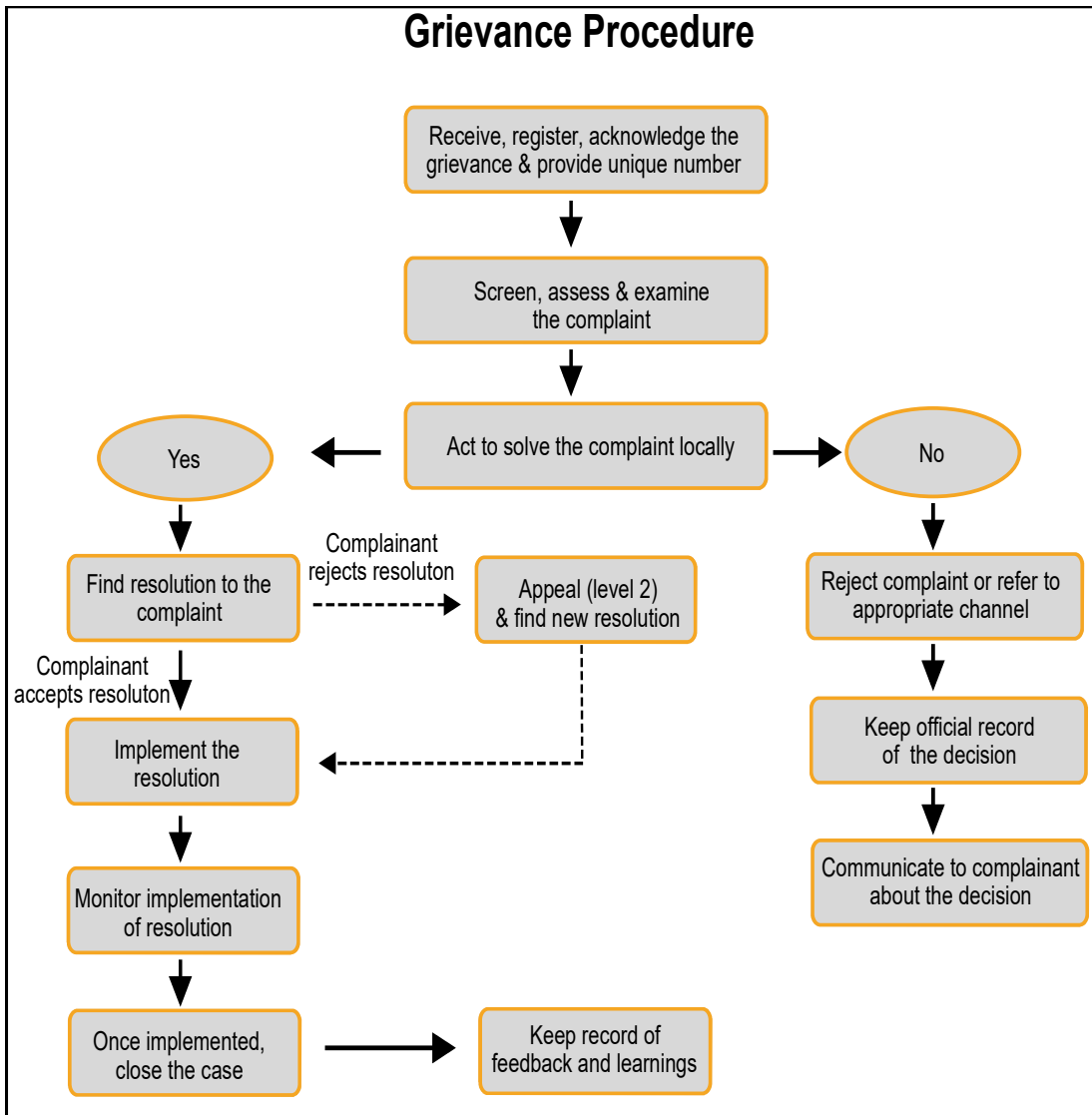


Figure 5-1: The GRM procedure

Grievance for GBV

The Social Unit at the Municipality will be responsible for grievances related to gender/SEA/SH and they in turn will refer to relevant service providers. For referral purposes, the OCMC, which is well equipped and functioning with adequate staffs will be contracted to render services to GBV survivors. The OCMC also has strong coordination with the municipality and other service providers in the area (For details refer Chapter 9).

5.9 Cost and Budget

The PMU will ensure adequate budget for the implementation of the SEP and information disclosure. The table below provides an estimated budget. The budget provided below is in

lump sum and can be revised, if and when necessary, mobilizing resources from other sources such as project contingencies.

Table 18: Budget for SEP

S.N.	Cost Item	NPR
1.	Training and Orientation	6,00,000
2.	IEC/Communication materials and distribution	8,00,000
3.	Consultation and meetings with various stakeholders	8,00,000
4.	Radio Announcements	3,00,000
5.	Website maintenance	3,50,000
6.	GRM	10,00,000
7.	Beneficiary Satisfaction survey	5,00,000
8.	Monitoring and reporting	2,00,000
9.	Contingency	5,00,000
Total		50,50,000

CHAPTER 6

Environmental and Social Risks and Impacts

The anticipated impacts of the proposed Bheri Pumping Sub Project are Physical, Biological and Socio- economic in nature. These impacts may occur in different phases of the project such as pre-construction, construction, and operation and maintenance phase. The impact need not necessary be limited to negative ones but can be positive as well. The objective of Environment Management is to augment positive impacts and to minimize negative impacts through sustainable mitigation measures. There are nevertheless, a range of opportunities open to local people, private sector and all other interested stakeholders to build-up and enhance positive impacts of the project.

6.1 Beneficial Impact

Construction Phase

a) Employment Generation

The project provides direct employment opportunities to the local people of the project area. The construction activities of the proposed project offer the locals an opportunity to be engaged in the proposed project activities as either skilled or non-skilled workers in terms of their competencies. The main target group for this benefit is people relying on daily wages. The Profile of Birendranagar Municipality, 2018 shows that around 17.34% of the households are engaged mainly in daily wage-based works as their main occupation. To augment the impact, the local people particularly the poor, Dalits, women from vulnerable groups will be given priority for employment.

b) Skill Enhancement

The construction of the project not only provides direct employment opportunities but also ensures the transfer of skills and technical competencies to the local workforce. The project activities such as construction of intake, treatment plant, RVT, Bulk Transmission line will provide transferable skills, if the local workforce is provided employment in these areas. If given the opportunity to work in construction phase, it is likely to enhance their skills in plumbing, fittings, and other construction works. In future, these skills can be a plus point for the locals in any relevant work as such.

Operation Phase

a) Improved health and hygiene

Deteriorating water quality and unsanitary conditions are often the causes of waterborne communicable diseases. As per the data revealed from District Health Office, Birendranagar, Surkhet (2020), out of total 89,337 cases of different infectious and contagious diseases registered in the OPD (out-patient department) of different hospitals in the Birendranagar Municipality, around 7% of waterborne diseases such as diarrhea, dysentery, skin disease, typhoid etc. were found. The provision of water treatment plant under the proposed project components provides a solution to the prevalent water-borne diseases in the municipality. After the implementation of this sub-project, easy access to safe and potable water will help in reducing the chance of occurrence of water-borne diseases for the beneficiaries in the future. This will also help them in saving up on the medical expenses due to water borne diseases.

The sub-project aims to provide safe, reliable and potable drinking water supply service, and the main target group of the beneficial impacts are the beneficiaries or people residing in the service area of this sub-project.

b) Utilization of saved time for other economic activities

The Profile of Birendranagar Municipality, 2018 revealed that major household work such as cleaning houses, washing clothes, childcare, cooking, rearing animals, and fetching drinking water is considered as work that only women are responsible for. As per the profile of Birendranagar Municipality, 58% of women are involved in water fetching and storage and 42% of male are observed to be involved in this activity. This indicates that women are more responsible for fetching water in comparison to men. Also, given the inadequacy of potable water supply within the sub-project area, a lot of time is spent fetching water for domestic purposes. This task is mainly borne by women and children, and this means more productive time is wasted in ensuring that the households have water in their homes. The primary aim of the sub-project is to provide adequate piped and potable water to each of the households connected to the water distribution network. So, once connected to this network, it would greatly reduce the time used in the afore-mentioned activities, and the saved time could be used by people to engage themselves in economic activities, generating revenue

and ensuring that girls are not prevented from attending school due to the need to fetch water for their households.

The summary of impact matrix of beneficial issues of the project is given in Table 19.

6.2 Adverse Impacts

6.2.1 Impact on Physical Environment

Construction Phase

a) Air Pollution

Inadequately managed or haphazard project activities can have a significant impact on air quality. These activities include:

- Earthworks such as clearing and excavations during dry seasons
- Demolition works
- Stockpiling of natural aggregates, excavated materials, and spoils
- Transport, loading, and unloading of natural aggregates
- Movement of construction-associated vehicles
- Possible burning of firewood for cooking and heating in work and labor camps
- Open burning of solid waste by workers
- Particulate Matter release from diesel generators
- Pipe laying across the Right of Way (RoW) of Ratna Highway

These activities can lead to increased levels of dust, carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons in the air. Furthermore, they are likely to cause traffic congestion during construction, especially since pipe-laying activities will be carried out along the RoW of the busiest highway in Karnali Province, Ratna Highway. This has repercussions for various stakeholders, including:

- Construction workers
- Residents living near the construction site, such as the Badi community near the Jhupra bank, Amrit Dada settlement, and settlements along the RoW in Ratna Highway from Subbakuna to Amrit Dada via Deuti Bajai to Bangesimal
- Passersby and commuters in the area

b) Land surface disturbance and degradation

The construction of a river intake and pumping system in Bheri River has the potential to impact soil and land surface. An estimated amount of 1,86,921.6 m³ earthworks will be excavated from the construction sites, including the intake, WTP, RVT and pipeline.

Activities such as riverbank cutting, excavation, and digging works along the banks of Bheri River during construction could lead to silt runoff and land disturbance, potentially causing erosion. Unregulated disposal of excavated earth may disrupt the community forests along the alignment of the bulk transmission line, as described in the biological section in this Chapter. Additionally, the proposed project involves the upgrading of an Internal Access Road, which includes 900m length of gravel road in Rani Chautari Community Forest.

Approximately 3 KM from the Bheri bridge, near Subbakuna, and along the pipeline alignment in Beureni, a recent landslide was observed. Construction activities in this area may result in slope instability and landslides due to site clearance and earthwork excavation.

c) Noise Pollution

Noise-emitting construction activities include earthworks, concrete mixing, demolition works, movement and operation of construction vehicles, diesel generator for power backup and equipment. The significance of noise impact is observed to be low since the major construction site of the project is situated far from public places (settlement areas). This will not have a significant impact to the locals but will have some impact on passersbys.

d) Generation of solid waste & wastewater from construction sites and worker's camp

The Worker Camps are proposed at the WTP sites and Amrit Dada. During the construction phase, generation of solid waste and wastewater from the construction sites and workers' camp is likely to create a nuisance in the surrounding areas. Soil runoff from the construction site may lead to off-site contamination, especially during the rainy season.

During the construction of structures (Intake, WTP, RVT, Transmission line etc.), a total of 250 laborers (skilled, semi-skilled and non-skilled) will be required in the Bheri pumping sub-project. An estimated amount of 3600 liters per day of wastewater (grey water) will be generated from labor camps, and similarly 3 tons of solid waste (organic & inorganic) is estimated to be generated from both the labor camps.

Due to the significant number of workers, improper disposal of solid waste and effluent from the workers' camp may create a nuisance in the surrounding area by contaminating the surroundings, potentially affecting the construction workers, residents in the area, and passersbys.

e) Muck disposal

As per the DPR report, an estimated amount of 70,095 m³ muck will be generated from the construction site. Improper disposal of construction debris may lead to off-site contamination of water resources.

f) Impact on water bodies

The excavation works for intake and RVT will have some impacts on the water quality of the Bheri river, causing turbidity in the water to a certain extent during construction phase.

g) Disruption of Natural Drainage

The pipe laying (Transmission line) works along the ROW of the public road from Subbakuna to Bangesimal via Deuti Bajai temple within the service area of the sub-project, may disrupt the existing natural drainage system. Construction activities, including earthworks, backfilling, and stockpiling, can interfere with the natural drainage flow. This has the potential to cause various impacts along the Ratna Highway, such as localized flooding, channel erosion, and landslides, among others.

h) Impact on Highway and road through Deuti Bajai Temple

The excavation, construction, and installation of the bulk distribution line along the Ratna Highway near the Mathillo Bera have the potential to result in significant consequences, including both temporary and permanent road disruptions. These disruptions could have a ripple effect on traffic flow, causing delays and congestion. Likewise, along the section on the Deuti Bajai road, there may be access restriction to houses, shops and other public services due to laying of bulk transmission line. Moreover, if the excavated surfaces are not properly managed, it could lead to channel erosion, which has the potential to negatively impact the settlements in the surrounding area. Specifically in the case of Amrit Dada settlement, and settlement near Deuti Bajai temple, Pipira chowk, Bulbule chowk, and

Mangalgadi chowk. Therefore, it is crucial to implement effective management practices to mitigate these potential issues and ensure the smooth execution of bulk distribution line.

Operation Phase

a) Water Pollution due to effluent and its disposal

The project involves discharging treated supernatant water into Jhupra Khola using a cascade outlet structure for gravity flow. Inadequate treatment of effluents from the Water Treatment Plant (WTP) or mishandling of chemicals like Poly Aluminum Chloride, leachate, disinfectants, and accidental chemical leaks can contaminate local water bodies through effluent discharge. However, as this project primarily aims to provide a drinking water supply, the risk of water pollution resulting from effluent and disposal is very low.

b) Noise Pollution & Vibration

Noise from water supply operations, such as pumping stations or treatment facilities, can cause vibrations that may impact operator health. However, the significance of noise and vibration impact is observed to be low in sub-project area as the operation site of the project is situated far from public places.

c) Solid waste:

A total of 21 operators (skilled, semi-skilled) will be required for the operation of pump, WTP & Reservoir sites in the Bheri pumping sub-project. An estimated amount of 134 kg/month of solid waste (organic & inorganic) will be generated from the operator buildings.

6.2.2 Impact on Biological Environment

Construction Phase

a) Impact on forest and forest products due to vegetation clearance

The potential impact on the vegetation and forest resources is primarily associated with the physical construction works, including the Intake, Water Treatment Plant (WTP), and bulk infrastructure construction. Most of these infrastructures are located within community forest areas. Specifically, the critical areas affected are the Intake and WTP construction sites in Rani Chautari Community Forest of Lakebesi Municipality, Ward No. 10. Similarly, the bulk transmission line alignment passes through the Bheri Community Forest and Shiva

Shakti Community Forest, while the RVT in Amrit Danda, Birendranagar Municipality, Ward 11, is located in the Aishwarya Mahila Community Forest.

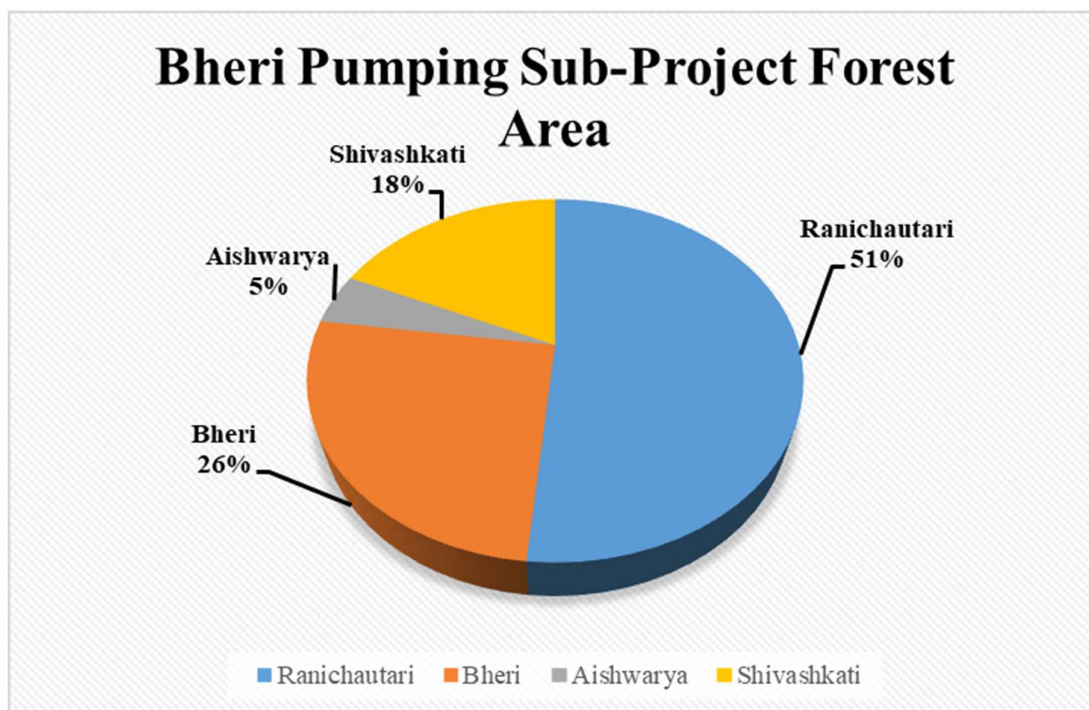


Figure 6-1: Proportion of Bheri Pumping Sub-Project Forest Area

The sub-project will require approximately 32,224.8 square meters (3.22 hectares) of forest area within these community forests that have a combined area of 1,125.72 hectares (Rani Chautari Community Forest (579.9 hectares), Shiva Shakti Community Forest (204.9 hectares), Aishwarya Community Forest (51.42 hectares), and Bheri Community Forest (289.5 hectares)). A census survey of the trees that will need clearance was carried out during the ESIA field survey. A total of 765 trees and 1021 poles (as shown in Table 10, Chapter 4) will require clearance for the construction and operation of sub-project activities.

In total, the Bheri Pumping sub-project will utilize around 0.3% of the total forest land of these four community forests. Although there will be a loss of approximately 1786 trees and poles, these are scattered across the four community forests with a combined area of 1,125.72 hectares. Therefore, the sub-project's impact on terrestrial flora (vegetation and forest resources) will be direct, adverse, and site-specific in extent, long-term in duration, with an overall pre-mitigation significance of 'Substantial.' Most of the potential project impacts on terrestrial flora occur during construction but are permanent and extend throughout the operation phase.

b) Pressure on the surrounding forest for its products like firewood, timber and non-timber forest products

The sub-project site, encompassing the Intake, Water Treatment Plant (WTP), RVT, and Transmission line, will host a relatively large construction workforce, including both local and non-local workers. It is proposed to establish two labor camps—one at the WTP site near the Ranichautari Community Forest and the other at the Amrit Dada site near the Aishwarya Mahila Community Forest. On average, there will be approximately 245 people present at the project site every day during the peak construction period. To reduce the burden on the nearby forest for firewood and other forest products, LPG will be provided for cooking purposes.

Similarly, non-workers who gather for economic opportunities may resort to tree cutting to build residences, stalls, and shelters, thereby exerting additional pressure on the local forest. Alongside the direct impacts on Non-Timber Forest Products (NTFPs) resulting from the placement of project facilities, there is a concern about the potential increase in demand or induced impacts on NTFPs due to the greater number of people during construction and beyond. If not adequately mitigated, these factors could have a long-term impact on the ecological goods and services provided by the forest.

c) Disturbance to wildlife habitat and movement due to construction related activities

During the consultation with Community Forest User Groups (CFUGs) in the ESIA field survey, no evidence of wild species movement was reported in the sub-project area. However, it's important to note that certain less mobile and often smaller species, such as the jungle cat, house rat, golden jackal, and hispid hare, may be particularly vulnerable to disruption and harm during activities such as clearing, excavation, grading, and filling. Therefore, measures should be taken to minimize and mitigate these potential impacts on this common wildlife in the sub-project area.

Operation Phase

a) Impact on aquatic life

The riverside intake will be constructed in Lakebesi Municipality Ward no. 10 on the left bank of the Bheri river and 550m upstream from the confluence of Bheri and Jhupra river. The existing rockface is used as a coffer dam, negating the need to divert for the construction

of structure. The 5-year return period low flow discharge of Bheri River is forecasted to be 57.604 m³/s. The option being considered to augment the water supply to Birendranagar by pumping 0.56 m³/s of water from the Bheri River, which is 0.97% of the lowest flow of 5-Year return period.

Moreover, the Bheri-Babai Multi-Purpose Diversion Project (BBMPDP) currently under construction approximately 12 km upstream to the intake site will divert 40 m³/s from Bheri River upon completion. Even post-completion of BBMPDP, a substantial flow of 17.604 m³/s will remain available even during the low flow condition, with only 3.49% of this discharge being utilized for the Bheri Pumping Sub-Project. Therefore, the impact on aquatic life, water uses, and water quality and quantity due to reduced source discharge or water-quality deterioration remains negligible. Moreover, for a 100-year return period, the high flow of the Bheri River is calculated at 6201 m³/s, and only 0.009% of this discharge will be extracted for this Bheri Pumping Sub-Project.

6.2.3 Impact on Socio Economic and Cultural Environment

Construction Phase

a) Land Requirement

According to a preliminary estimate, a total of about 5.95 hectares of the land area will be required permanently for the implementation of the project. The detail is presented in Table 18.

Table 18: Land requirement for the project

Component	Type of Land Requirement	Community Forest (m²)	Private Land (m²)	River Flood Plain (m²)	Government Land (RoW) (m²)	Total (m²)
Intake	Permanent	400	NA	NA		400
WTP		8399.80	NA	NA		8399.80
RVT		2800	NA	NA		2800
Intake	Temporary					
WTP						

RVT						
Pipeline (m ²)	Permanent	20625				20625
Intake to Amritdanda (RVT)	Temporary					
Bulk Distribution System	Permanent				27295.30	27295.30
	Temporary					
Grand Total(m²)						59,520.10 m² (5.95 hectare)

Source: ESIA Field Study, 2023

b) Community health and safety

Communities will be exposed to cross-cutting threats from construction's impacts on air and water quality, ambient noise level; traffic and road safety; mobility of people/goods/services; access to properties/economic activities/social services; service disruptions, etc. Community may be potentially exposed to surge of communicable diseases by construction workers. Likewise, laying bulk transmission lines and its testing before it is covered will create limited access into houses and economic impact on businesses.

c) Occupational Health and Safety

Workers will also be exposed to the cross-cutting threats of the afore-mentioned impacts during construction phase. Inadequate supply of safe/potable water and inadequate sanitation facilities; poor sanitation practices on site; poor housing conditions; handling and operation of construction equipment; handling of hazardous substances; exposure to extreme weather and non-observance of health and safety measures, pose additional threats to the health and safety of construction workers. Construction workers may also be potentially exposed to communicable diseases in the community.

d) Labor Influx

The arrival of a large number of workers from diverse backgrounds may disrupt the social dynamics of the local community. It is estimated that there will be around 250 workers during the peak construction period. The Intake and WTP are not in close proximity to any settlements apart from the Badi community across Jhupra river. However, there is a settlement below Amrit Dada, which is inhabited by Dalits and other vulnerable communities. Arrival of workers means that they will have a need for housing, food supply, transport, health care, social interaction and entertainment. There may be other possible adverse impacts like risk of social conflict, increased risk of illicit behavior and crime, increase in traffic and related accidents, increased demand for electricity, water supplies and sanitation, increased pressure on health services, among others. In addition, labor influx can also create an environment where workers are vulnerable to exploitation, such as long working hours, low wages, poor working conditions, sexual exploitation and sexual abuse, and violations of labor rights.

e) Impact on Forest Use

Although the works will be carried out in the forest area, forest users will not be significantly affected by the construction work as the construction works will only be carried out in a limited part of the community forest area. During the consultations, the forest user groups explained that there was no such dependence on forest products of one particular group, and for all community forest users (IPs or non-IPs), the forests are opened twice a year for the users to cut grass (in August-September) and collect fodders and fallen tree branches for firewood (in January-February). In the consultations, they further stated that the community forest user committees would provide necessary consent to the use of forest (refer Annex 7 for their consent letter).

Direct impact area (entire project footprint for Package-1 lies in community forest and public/government land) of the project includes Ranichautari Community Forest (Lakebesi Municipality-10), where the intake and water treatment plan (WTP) will be built. Likewise, the area around Amrit Danda will house the Reservoir Tank (RVT) and the transmission line will pass through four community forest areas (Bheri, Shivshakti and Aishwarya Community Forest) located in Birendranagar Municipality-11. In addition, the bulk transmission line will pass through the right of way (RoW) of the Ratna Highway from Subbakuna to Bangesimal. As such, no adverse impact was foreseen to the forest users and settlements near the project footprints, mainly the settlement near Amrit Dada.

f) Impact on tangible heritage and cultural property

The construction phase of water supply can have some impact on tangible heritages and structures with cultural, religious and spiritual significance. For instance, in Amrit Dada, near the telecommunication tower, there is a Shiva temple and due to the construction of RVTs and bulk distribution line at Amrit Dada, there is a possibility of disruption to this sacred place. In addition, while carrying out excavation for RVTs and digging trenches for laying the bulk transmission line, there may be a possibility of unearthing tangible heritages or structures of cultural, religious or spiritual significance.

g) Risk of child or forced labor

There is a risk of use of child labor or forced labor. The Child Labour (Prohibition and Regulation) Act of 2000 establishes the minimum age for work at 14 and the minimum age for hazardous work at 16 and prohibits forced or compulsory labor. However, Nepal Labor Force Survey (2022) indicates that use of child labor and forced labor is prevalent in construction sector. The Nepal Child Labour Report 2021 published jointly by Government of Nepal (GoN) and International Labour Organization (ILO) reports that, among seven million children (total children) between the ages of 5 and 17 in Nepal, 1.1 million children (15.3%) were found to be engaged in child labour. The child labour prevalence for children between age of 5 and 13 years was 18% while it was 10% for the children between age of 14 and 17. As per the report, child labour is the highest in Karnali (24.6%) province and the highest child labour prevalence is found among Dalits (19.4%).

It is also apparent that poor income households often supplement their income through child labour. These households need to gain income from all sources as increased poverty in the households leads to increased willingness to send children to work leading to higher rates of child labor. It should be noted that child labour does not solely arise in construction work, children are often employed as cleaners, cooks, helpers for running errands and carrying supplies. As one of the labour camps will be right above the Amrit Dada settlement, which is both inhabited by Dalits and vulnerable community, both local workers as well as migrant workers are subject to afore-mentioned exploitations. Thus, the risk of child and forced labour is always an underlying risk that may occur where infrastructure projects are being undertaken.

h) Gender Based Violence (GBV) and Sexual Exploitation Abuse and Sexual Harassment (SEA/SH)

During the peak period of the construction phase of this sub-project, a daily workforce of up to 250 laborers is anticipated to be engaged. In addition to the project personnel, various other stakeholders will also participate. Given the influx and mobility of these individuals, there is a significant potential of gender-based violence, sexual exploitation and abuse, and sexual harassment, especially targeting women in labor camps and neighboring communities. Thus, it is imperative to carefully consider these potential risks and proactively devise measures to address them.

i) Impact on gender and vulnerable groups

As per the consultation carried during the ESIA study, residents of Amrit Dada, a settlement near the RVT construction site of this sub-project, and Badi settlement on the left bank of the Jhupra River near the WTP area are the main vulnerable groups of this project. This settlement is vulnerable since the majority of the people have migrated to this place from other adjoining districts. Likewise, the settlement also has a higher percentage of Dalits. In addition, the community from these settlements are vulnerable since they are all marginal landholders and poor. Similarly, the labour camp which has been proposed in Amrit Dada is near a settlement inhabited by Dalits and other vulnerable groups. Given the vulnerability of these communities in terms of education, knowledge, skills and awareness on laws relating to labour and GBV, there is a potential risk of GBV, SEA/SH, other illicit behaviors as well as exploitation when employed.

Operation Phase

a) Impact on water use rights of local people

According to the study conducted on design of river intake in Bheri river for Surkhet valley water supply project, the average monthly discharge of Bheri river is about 332 m³/s. The amount of water withdrawn from Bheri is 560l/s in design year. Low flow of the Bheri River for the 5-Year return period is estimated at 57.6 m³/s and the high flow for the same return period is 3,412 m³/s. Moreover, the flow measured in December 2020 was 103.5 m³/s. The option has been considered to augment the water supply service to Birendranagar by pumping 0.56 m³/s of water from the Bheri River, which is 0.97% of the lowest flow of 5-Year return period.

As per the field study conducted during the ESIA, nearly 500 meters downstream of the Bheri River from the proposed Intake site, there is the confluence of the Bheri and Jhupra rivers and about 500 meters below the confluence, there is Bheri Bridge in the Ratna Highway section. Also, just adjacent to the bridge towards the downstream there is a cremation site. As the Bheri Pumping sub-project, while operating in its full capacity, uses only 0.57 percent of the total flow even during the dry season, therefore this project will not cause shortage of water required for cultural purposes in the cremation site.

Additionally, occasionally, residents of the informal settlement who reside on the banks of the Jhupra River, about 1 km downstream from the location where the intake is being built, go fishing in the Bheri River. However, since there won't be any adverse effects on the aquatic life of this river as a result of this project, it is unlikely that fishing will be made more difficult for locals.

About 6 kilometers downstream from Bheri bridge, there is a village called Salghari with four families. This settlement belongs to Bheriganga municipality. Also, there is no settlement on the banks of Bheri river towards Surkhet district. As a result, the number of users of the Bheri River is negligible as it flows through a completely unpopulated area.

b) Delivery of Unsafe Water

Unsafe water delivered due to any one or combinations of the following will have impact on public health.

- accidental human error in adding disinfectant;
- accidental spill of hazardous substances;
- leaks in the system;
- lack of environmental quality monitoring;
- inadequate maintenance and housekeeping

c) Impact on gender and vulnerable groups

As per the consultation carried out during the ESIA study, residents of Amrit Dada, a settlement near the RVT construction site of this sub-project, are the main vulnerable groups of this project. Since there are no human settlements around the intake and WTP construction area, impact on other communities will be less. Also, there will be a labor camp in Amrit Dada, where mostly outside labor force will stay. There is a possibility that they may have conflict with the local community, and there is also a possibility of sexual abuse

against the people of the community, especially women and teenagers. Since the RVT construction side passes by the Amrit Dada community, there is also a possibility of noise and air pollution.

Moreover, during the consultation with different vulnerable groups (Feminist Dalit Women Organization (FEDO), Women's Organization for Marginalized People, National Indigenous Disabled Women Association of Surkhet etc.) during the ESIA study, the groups have requested equal opportunity in the decision-making process, and that people from these groups with required qualification and experience for respective roles should be prioritized in different positions during the construction and operation of the sub-project.

6.3 Mitigation and Enhancement Measures

The environmental and social impacts discussed in the preceding sections may either have adverse or beneficial effects. To ensure the sub-project's sustainability, it is necessary to effectively manage these impacts. Therefore, the ESIA study has proposed a) Mitigation Measures: aimed to reduce or eliminate or avoid the adverse impacts; and b) Enhancement Measures: aimed to maximize the beneficial impacts.

In the event that adverse or beneficial impacts that were not initially identified or anticipated during this study stage are discovered during the construction and operation phases, the project proponent will assume full responsibility for addressing these impacts at its own expense. Additionally, the proponent will compensate affected parties for any loss of life, livelihood, or property resulting from the project's implementation, in accordance with prevailing laws.

6.3.1 MITIGATION MEASURES

6.3.1.1 For Impact on Physical Environment

Construction Phase

a) Air pollution

The measures to mitigate the impact due to air pollution are:

- Confining earthworks according to an Excavation Segmentation Plan as part of the C-ESMP.

- Sprinkling water on all gravel and earthen road sections in the Amrit Dada settlement, settlements along the RoW on Ratna Highway from Subbakuna to Bangesimal via Deuti Bajai, and the access road from Bhangari to intake side site that passes through the settlements and proposed infrastructure sites. This activity will be carried out at least two times a day or as necessary to mitigate dust and maintain road quality.
- Enforcing the utilization of tarpaulin covers for transporting construction materials and ensuring adequate covering for stockpiled natural aggregates, excavated materials, and spoil.
- Limiting the speed of construction vehicles on access roads and work sites to a maximum of 20 Km/hr.
- Prohibiting open burning of garbage particularly in forest areas, by issuing notices and raising awareness.
- Ensuring that all vehicles associated with the project (consultants, contractors, or vendors) comply with the national emission standards. Regular (monthly) maintenance check-ups for all vehicles will be carried out every 3000 km.
- Conducting monthly Air Quality Test for dust nuisance (PM 10 and PM 2.5) at key locations such as the periphery of Amrit Danda settlement, the Badi community area, sections from Deuti Bajai temple via Ratna highway to Bangesimal and market areas, school, and hospital during the dry working season (January-June). The tests will be carried out by a medium Fine Particulate Sampler (Envirotech APM 550) and the determined pollutants will be compared with the National Ambient Air Quality Standards (NAAQS) of 2012.
- Supply of alternative cooking fuel to workers instead of allowing them to use firewood for cooking by the concerned Contractor.
- Ensuring construction workers use breathing masks in areas prone to dust.

b) Potential land surface disturbance and degradation

The proposed mitigation measures for addressing potential land surface disturbance and degradation are outlined as follows:

(i) Implementation of Earthworks Plan: The earthworks will be carried out according to an Excavation Segmentation Plan as an integral part of the C-ESMP.

(ii) **Precautionary Measures during Construction:** During construction activities, such as excavation for the intake, reservoir, pipeline, and related components, stringent precautionary measures will be strictly followed. These measures encompass the safe handling and proper disposal of excavated materials in accordance with the Excavation Segmentation Plan. Following measures will be implemented:

- Avoid construction activities during the rainy season wherever feasible to minimize the potential for erosion and other weather-related issues.
- Prohibit the Contractor from clearing or disturbing any land beyond what is approved by the GoN and Forest Clearance Permit approvals.
- Preserve as much natural vegetation as possible, especially near rivers, floodplains, steep slopes, and residential areas.
- Remove, store, and seed or cover topsoil, along with associated leaf litter and organic matter, for post-construction land stabilization.
- Stabilize disturbed areas as soon as possible in a progressive manner.
- Provide proper drainage controls to manage water flow through disturbed areas and to direct surface water away from steep slopes or other erodible areas to natural drainage ways.
- Protect exposed slopes by installing cut-off drains above and toe-drains below high cuts and provide terracing as needed to avoid the potential concentration of stormwater runoff across disturbed soil.
- Strictly enforce the prohibition on side casting of excavated material. The excess excavated material is to be hauled to a designated spoil site.
- Implement the grievance mechanism, which will allow local stakeholders to inform the Project and the Contractor of any land disturbance and erosion issues.

(iii) **Slope Protection and Retaining Walls:** In order to mitigate slope instability and prevent landslides, it is crucial to implement effective slope protection measures along the transmission line alignment. This objective will be achieved through the construction of retaining walls and the utilization of bioengineering techniques. Retaining walls will offer structural support to the slope, while bioengineering methods will involve the utilization of vegetation and natural materials to reinforce and stabilize the slope, thereby reducing the risk of landslides. Approximately 3 KM from the Bheri bridge, near Subbakuna, and along the pipeline alignment in Beureni, a landslide was observed. To mitigate this impact,

bioengineering technologies have been recommended. The associated costs for these measures are itemized in the Bill of Quantities (BoQ) (refer to Table 19 for specific details).

c) Noise Pollution

The measures to mitigate the noise pollution include:

- Using equipment that emits the least noise, ensuring proper maintenance and efficient mufflers.
- Limiting noise-generating construction activities, such as vehicular movement, to daytime hours (preferably between 9:00 a.m. to 6:00 p.m.).
- Prohibiting horn usage in critical stretches close to villages, the school area in Amrit Dada settlement, Nawa Jyoti Sishu Club, and along the internal access road from Bhangari to intake area. This will be enforced by installing signs.
- Conducting noise level test once a year during the peak construction stage at specified locations near schools, hospital and settlement: Amrit Danda, Nawa Jyoti Bal Bikash Kendra; Ranichautari, Bheri, Shiva Shakti and Aishwarya Community Forest areas.
- Providing ear mufflers to workers operating high dB construction equipment.
- Implementing regular inspection & maintenance of construction/transportation vehicles to ensure compliance with National Noise Standard Guidelines (NVMES, 2069 B.S., 2012).
- Performing regular inspection and maintenance to ensure compliance of diesel generators with National Diesel Generator Emission Standard (2012).

d) Generation of solid waste & wastewater from construction sites and labor camp

Different arrangements will be made for construction waste and domestic waste generated from the sub-project area. The Contractor will be required to prepare a detailed Solid Waste Management Plan as an integral part of C-ESMP describing in detail the methods it will use to manage wastes in accordance with international good practice. At a minimum, the Contractor will be required to implement the following mitigation measures to avoid improper solid waste disposal:

- Maintain all facilities in a neat and tidy condition and keep all construction sites free of litter. Random disposal of solid waste will be strictly prohibited.

- Discharge of any untreated wastewater to any receiving water will be strictly prohibited.
- Open defecation by project workers will be strictly prohibited.
- The waste will be segregated into degradable and non-degradable categories at source. Separate garbage containers, clearly labeled for degradable and non-degradable waste, will be placed inside camps, camp premises, and various locations on construction sites.
- Workers will receive regular training sessions in the principle of the 3R's (reduce, reuse, and recycle) and other forms of information dissemination to raise awareness about the importance of proper waste management that will be applied to the extent possible.
- Ensure storage areas are secure, safe, and weatherproof for storage of construction material.
- Provide reusable/recyclable waste to scrap vendors, while non-degradable waste will be disposed off in coordination with the Birendranagar Municipality and PIU.
- Ensure dumping of biodegradable waste into a designated pit and covering for a specific period to facilitate decomposition. The resulting compost can be utilized for agricultural purpose. If composting is not possible, biodegradable solid waste will be disposed of in waste bins managed by the municipality.
- Segregated non-degradable waste generated from the workers' camp will be transported to the designated landfill site through joint coordination between the Birendranagar Municipality and the contractor.

e) Muck disposal

Approximately 70,095 m³ of muck is expected to be generated during the construction phase. The Contractor will be required to prepare a detailed Muck Disposal Plan as an integral part of C-ESMP describing in detail the methods it will use to manage the generated muck in accordance with international good practice. The disposal of excavated earthwork will be carried out in collaboration with Birendranagar Municipality and PIU, following a coordinated approach. The process will encompass compaction, erosion protection, safe transportation, and appropriate disposal practices. Whenever feasible, the generated muck will be repurposed for other construction activities, in consultation with Birendranagar Municipality.

The recommended sites for the muck disposal include Birendranagar Municipality wards 7, 8, and 12, as well as Itram and Khorke river corridors, and the stadium within Birendranagar Municipality (**Annex 8**). The Project will implement the following mitigation measures in general:

- Develop engineering designs for all designated muck disposal areas.
- Ensure that muck disposal in these suggested locations is carried out with due consideration for environmental, social, and financial risks linked to these facilities.
- Maintain close and regular monitoring of these muck disposal areas during construction through the Municipal Support Team (Owners Engineer).

f) Impact on water bodies

The measures to mitigate the impact on water bodies include:

- Earthworks generating significant amounts of spoil will be scheduled for the dry season to mitigate challenging working conditions prevalent during the monsoon season, such as runoff problem to the nearby water body.
- Strict restrictions will be in place to prevent disposal of spoil or waste into the nearby Bheri and Jhupra rivers.
- Regular water quality monitoring will be carried out.

In addition to general measures, following specific precautions will be implemented to prevent pollution of existing natural surfaces during the construction period:

- Identifying stock yards for construction materials at least 300m away from water courses.
- Locating storage areas for fuel and lubricants away from any drainage leading to water bodies.
- Constructing separate toilets with septic tanks for males and females, collecting grey water in designated pits, and treating it before releasing it into the Bheri and/or Jhupra River.

g) Disruption of Natural Drainage

During construction activities, it's crucial to minimize any adverse impacts on the natural drainage system. The identified mitigation measures are as follows:

- Ensure that pipe laying works do not obstruct or interfere with the existing natural drainage pathways. Plan the layout of pipes to avoid disrupting the flow of water.
- Develop and implement temporary drainage facilities to divert natural water flow during construction. These facilities should effectively manage water to prevent disruption to the existing drainage system.
- Protect exposed slopes by installing cut-off drains above and toe-drains below high cuts and provide terracing as needed to avoid the potential concentration of stormwater runoff across disturbed soil.
- Plan the excavation and laying of the transmission line across Ratna highway during periods of less traffic. This approach will minimize disruptions to both traffic and the natural drainage system.
- Safely stockpile excavated materials in designated locations according to the muck disposal plan. Proper storage ensures that the excavated materials do not impede the natural drainage pathways. The Contractor will ensure that the natural drainage system is restored to its original state after completing construction works. If the drainage system is blocked or altered during construction, take steps to rehabilitate and restore it, ensuring proper functionality.

h) Impact on Highway and roads through Deuti Bajai Temple

The contractor is responsible for developing a comprehensive Traffic Management Plan as an integral part of the C-ESMP. This plan will clearly outline steps and strategies to minimize potential impacts, particularly on Ratna highway and other road users in the areas of Subbakuna, Pipira chowk via Deuti Bajai and Bangesimal. It is imperative that the Contractor strictly adheres to this plan throughout the construction phase of the sub-project.

The following measures will be implemented to mitigate traffic-related impacts:

- **Strategic Scheduling of Work:** The Contractor will schedule construction work during off-peak hours or seasons, effectively reducing the impact on Ratna highway traffic.
- **Installation of Protective Measures:** Protective measures will be installed to safeguard the integrity of the Ratna highway section from Subbakuna to Bangesimal, passing via Deuti Bajai, particularly in proximity to the Bulk Transmission lines.
- **Temporary Ramps and Enhanced Signage:** Within the Deuti Bajai section, temporary ramps will be constructed to facilitate unrestricted access, and appropriate

fencing and signage will be installed to guide and manage pedestrians and other traffic effectively during the laying of the bulk transmission lines.

Operation Phase

a) Possible water pollution due to effluent and its disposal

The measures to mitigate the possible water pollution due to effluent and its disposal are following:

- **Sludge Management:** Two sludge lagoons with a total surface area of 104 m² and volume of 348 m³ are proposed. These lagoons, located at the treatment plant, will receive sludge generated from various processes in the plant. The sludge lagoons will have protective layers and allow settlement of solid particles before discharging treated water into Jhupra Khola, ensuring compliance with permissible effluent standards.
- **Sludge Disposal:** Dried sludge will be collected, transported, and disposed of at a designated site. Birendranagar municipality is tasked with identifying an appropriate and sustainable disposal site.
- **Effluent Quality Monitoring:** The treatment plant will undergo regular cleaning, and effluent quality will be consistently monitored to ensure compliance with the established discharge standards set by the Government of Nepal (GoN) and the World Bank EHS guidelines.
- **Operation and Maintenance:** The operation and maintenance of the WTP will follow a scheduled plan, ensuring its proper functioning and adherence to operational standards

b) Noise Pollution & Vibration

The significance of noise and vibration impact during operation is observed to be low in areas since the operation site of the project is situated far from public places. Following are the recommended mitigation actions.

- Standard Operation Procedure (SoP) will be adopted for the operation of WTP. The operation and maintenance of the WTP will follow a scheduled plan, ensuring its proper functioning and adherence to operational standards.

- The equipments will be regularly maintained and inspected to ensure it is operating at an optimal efficiency, minimizing noise production and vibration.

c) Generation of solid waste and waste from construction sites and worker's camp

A total of only 134 kg per month of solid waste (organic and inorganic) is estimated from the 21 employees during operation. Therefore, the impact is expected to be insignificant. Following are the recommended mitigation actions.

- Maintain facilities in a neat, tidy condition, and prohibit random solid waste disposal.
- Provide identifiable litter bins at convenient locations to discourage littering and promote responsible behavior.
- Train employees in the 3Rs (reduce, reuse, recycle), segregate recyclables and perishables, and ensure proper disposal of non-recyclable waste at an approved landfill at least once a week.

6.3.1.2 For Impact on Biological Environment

Construction Phase

(a) Impact on forest and forest products due to vegetation clearance

Following are the recommended mitigation actions to counter impact on forest and forest products due to vegetation clearance.

- राष्ट्रिय प्राथमिकता प्राप्त योजनाको लागि राष्ट्रिय वन क्षेत्र प्रयोग गर्ने सम्बन्धी कार्यविधि २०७६ (Procedures and Criteria related to Using National Forest Area for National Priority Project 2019) will be duly followed to compensate for the forest land to be acquired for the project and the trees felled.
- All areas to be cleared prior to clearance will be marked. Clearing vegetation outside of designated areas beyond what is approved by the GoN and Forest Clearance Permit approvals will be prohibited.
- Vegetation will be removed strictly in accordance with the needs of the project structures and facilities, following proper marking and documentation of the trees earmarked for felling. This process will involve a joint inspection, which

includes representatives from the forest authority. The proponent will cover the expenses associated with the compensation for the government and community authority involved in the inspection, as well as the costs of felling the trees and managing the stockpile.

- Priority will be given to the local community for the allocation of the trees that have been felled for their future use.
- The proponent will ensure compensation for the leased forest land, in accordance with Schedule 20 of Forest Regulation 2079, for a period of 3 years to adhere to the stipulations of this procedure.
- The project will conduct the clearance of the forest and proper stockpiling of materials in line with the guidelines outlined in the Forest Product Collection, Sale, and Distribution Guidelines (2073), and subsequently deliver them to their respective owners.
- The Contractor will be required to prepare a detailed Revegetation Plan as an integral part of C-ESMP describing in detail the methods it will use to manage carryout the revegetation activities.
- A nursery will be established in consultation with Birendranagar municipality and DFO to propagate seedlings to rehabilitate disturbed areas using native tree species.
- Plans are in place to plant and preserve 17,860 seedlings to compensate the felling of 765 trees and 1021 poles for the project, following a ratio of 1:10. The Project will conduct the plantation in the designated land as compensation for the forest land used. Alternatively, the project will fund the planting and management of these plants for five years, providing the necessary resources to the DFO Surkhet for the plantation and conservation efforts.
- After consulting with Birendranagar Municipality, several sites were assessed for the possibility of plantation and nursery establishment. However, considering feasibility and accessibility, Gaushala site ward number 11 and Bhairab Community Forest ward number 6 in Birendranagar Municipality were recommended to initiate afforestation and forest conservation efforts (Figure 6-2). Gaushala side ward number 11 offers approximately 1.8 hectares of suitable land, while Bhairab Community Forest Area has about 1.42 hectares identified for this purpose. Both of these identified sites are also conducive for the regeneration of Sal (*Shorea robusta*) seedlings due to their

proximity to **Mother Trees**. The PMU/PIU will also explore options for regenerating natural Sal seedlings in the project-sponsored nursery in consultation with the District Forest Office (DFO). Moving forward, the Project will actively seek additional suitable plantation sites in collaboration with Birendranagar Municipality and DFO, ensuring compliance with the provisions of Forest Regulation 2022.

Proposed plantation site in consultation with the Mayor of Birendranagar Municipality



Figure 6-2: Proposed Plantation Site

(b) Increased pressure on the surrounding forest for its products like firewood, timber and non-timber forest products

The project will make effective arrangements to minimize the pressure on the forests resources to meet their demand for forest products and this will be strictly monitored to avoid and/or minimize the tendency of collecting firewood from the local forest. The following provisions will be made to avoid this impact:

- Locals will be given higher preference in construction related jobs to minimize the impacts related to outside workforce by an obligatory contractual clause in the contract document. As they are living in the same area, it will not pose an extra burden to the existing forest areas and resources.
- Fuel for cooking will be managed for the workers, particularly for the non-resident workers, by using kerosene or LPG to meet the fuel requirements. To offset the impact of outside opportunity seekers on forest, the interested local business people will be given opportunity for the opening of canteen within the camp and construction area to meet the construction force requirement.
- Metal frames and prefabricated materials will be used for construction of temporary site offices and camps.
- The project management and contractor will impose complete prohibition on the purchase, sale and storage of the local high value NTFP and fishes within the camps. Anyone found with local high value NTFP in the camps should be penalized. This is a management task, and no extra cost is envisaged.
- Project's management team and contractor's management team will develop a code of conduct for workers. Notice on this regard will be posted in both labor camp site's notice boards on a permanent basis.

(c) Disturbance to wildlife habitat and movement due to construction related activities

The project does not envisage major impact on wildlife habitat and its movement because the sub-project is situated within community forest areas, adjoins two municipalities with scattered settlements that have a considerable population near these community forests. These community forests also run alongside Ratna Highway, experiencing significant daily

human movement and activities, and they are not the primary habitat for wild fauna. Following measures are recommended for impact on wildlife and its habitat, if any:

- Construction work will be scheduled during the daytime. Restriction will be put on the noisy construction activities during nighttime to allow wild animals to use the forest areas.
- Speed limit will be enforced and blowing horns will be prohibited in project access passing through forest area.
- Unnecessary lighting and bright lights will be avoided. Use of loudspeakers will be banned in the workers' camp.
- A Worker Code of Conduct that expressly prohibits illegal logging, clearing, hunting, poaching, and collection of animal and plant species in general, including fines and dismissal for repeat offences will be established, implemented, and enforced.

(d) Impact on Forest use:

While the construction activities for the Bheri Pumping sub-project are slated to occur within the forested region, the impact on forest users is expected to be minimal. The construction will be confined to specific sections within four community forests, accounting for approximately 0.3% of the combined forest land. In order to minimize the effects on forest use resulting from the installation of various infrastructures within the forest, such as intakes, RVT, WTP, and transmission lines, the following measures are recommended:

- Limited Clearing and Vegetation Removal: Minimal trees and vegetation will be cleared for the construction of different infrastructures. During the alternative analysis (refer Chapter 8 for details), construction sites have been chosen in such a way that there will be minimal impact on the surrounding forests due to the project implementation.
- Establishment of Nursery and Implementation of Reforestation Program: The project will establish a nursery to propagate seedlings, focusing on rehabilitating disturbed areas using native tree species. A reforestation program will be executed to plant and preserve 17,860 seedlings, offsetting the loss of vegetation and mitigating the impact on forest use caused by the project.

Operation Phase

(a) Impact on aquatic life

The Bheri Pumping sub-project will utilize a pumping rate of 0.56 m³/s from the Bheri River, constituting only 0.97% of the lowest flow observed during a 5-year return period in the Bheri River. Therefore, the operational phase is expected to have a negligible impact on aquatic life, either through reduced source discharge or deterioration of water quality. To minimize the operational impacts of the Operator Camp, the following measures are recommended:

- Regular monitoring of Operator Camp Activities by the Municipality
- Provision of adequately equipped toilets
- Proper segregation and disposal of solid waste generated from the Operator Camp, in coordination with the Birendranagar Municipality.
- Restriction of Pump & WTP operators from engaging in fishing. The operation manual will incorporate a Worker Code of Conduct explicitly prohibiting illegal fishing in the Bheri and Jhupra rivers by the operation team.

6.3.1.3 Impact on Socio-economic and cultural environment

Construction Phase

(a) Community health and safety hazards

- Inform and regularly update and organize awareness campaigns targeting the affected communities, including vulnerable groups, about potential project hazards and changes to project activities that may have environmental, health, or safety impacts, as well as the proposed prevention, mitigation, and emergency response measures.
- Safety sign boards and caution boards will be placed at construction sites, labor camps, stock-piles sites, and spoil disposal sites.
- Active sites will be well demarcated and bounded. Excavated sites will be well bounded with hard barricades.

- Unauthorized entry to active construction sites and stockpile sites will be strictly regulated.
- Movement of vehicles for construction activities will be strictly regulated under safety guidelines.
- Code of conducts will be implied for the workforce so that they have no conflict with the local communities.
- Under the context of spread of the SARS-CoV-2 pandemic, the workforce will be instructed to have minimal contact with the community people even though in the recent days the impact has been lowered.
- Coordination will be done with the relevant stakeholders for the community awareness program, hoarding board, IEC material, and provisions of code of conduct will be strictly implemented and disseminated in the sub project site around Amrit Dada, Jhupra Settlement, Badi community, Tharubas community, BDS (Pipira Chowk to Bangesimal) around Deuti Bajai temple.
- Provision of ramps will be made where trenching works are being carried out to provide access to houses and businesses.

(b) Occupational Health and Safety

- Provide comprehensive training to all workers on occupational health and safety practices. This should include proper use of personal protective equipment (PPE), safe work procedures, emergency protocols, and awareness of specific hazards related to the construction site.
- Develop a comprehensive risk management plan that includes strategies for hazard prevention, mitigation, and emergency response.
- Regularly inspect and maintain all machinery, tools, and equipment to ensure their proper functioning and safety.
- Contractor will have a mandatory provision of not to use any child or force labor during the construction phase of the sub project.
- The contractor will be informed to adopt safe construction practices to minimize construction related accidents and possible health consequences.

- Construction workers will be trained in job hazards, emergency procedures and in any other relevant safety measures.
- It will be mandated that all the workers and engineers will have to wear these gears inside the construction sites to minimize the health impacts of the fugitive dusts and head safety.
- Barriers and guards will be installed to restrict access of unauthorized persons to active construction sites.
- Lighting and ventilation systems will be installed at all construction sites.
- Contractor will arrange the First Aid Kit Box and standby medicine for workforce during working period and emergency situations. Adequate and easily accessible first-aid outfit should be available on the site. Some of the work force should be trained to use the outfit. The contractor should also make provisions for an ambulance to take injured for ill person to the nearest hospital, if needed.
- Dust control will be done by spraying water twice a day in access road.

(c) Labor Influx

During the peak construction period an estimated 250 labours (skilled, semi-skilled and unskilled) will be required in two labor camps, one in Amrit Dada and another in WTP site in Ranichautari Community Forest. So, management of this labour influx and of issues related to the labour campsite are a critical part of environmental and social management of the sub-project. To address the probable impact due to labour influx, and establishment of labour / workers camp, a detail camp management plan will need to be prepared to minimize and mitigate the environment and social impact. The plan should put out specific measures that will be undertaken to control degradation of the surrounding landscape due to the location and operation of the proposed construction camp and will minimize the impact on the local community. The plan will include elements such as details on living condition and ancillary facilities, worker codes of conduct, training programs on HIV/AIDS, etc. In addition, the recruitment and training of local workforce shall be proritized to maximize local employment opportunities.

In addition, the key aspects that should be considered for preparation of workers camp management include the following.

- Sufficient supply of potable water to camps and working sites. If the drinking water is obtained from the intermittent public water supply then storage tanks must be provided.
- Adequate washing, bathing and sanitary facilities must be provided in clean and drained condition. Separate toilet facilities must be provided for female workers.
- Collection of camp wastes and its disposal should be carried out regularly and the contractor must ensure there is proper drainage system.
- Adequate supply of fuel in the form of kerosene or LPG should be provided to construction workers to avoid felling of trees for cooking and proper lighting measures should be put in place.
- Camps should be equipped with first aid facilities and there should be provision of ambulance if workers are to be taken to the hospital.
- Workers camp site should be secured by temporary fences that can be easily disposed off.
- Introducing a worker Code of Conduct as part of the employment contract including sanctions for non-compliance.
- Workforce will be informed about the culture and living style of the project area. They will be instructed to respect the locally accepted culture and living style.

(d) GBV and SEA/SH

As mentioned, during peak construction period there will be around 250 workers/labourers. In order to safeguard the community from sexual misconduct and breaching of social/cultural norms and values, there will be strict adherence to SEA/SH action plan (please refer to chapter 9 for details). The SEA/SH action plan among others must include:

- Conduct training for contractors and their workers on Gender Based Violence and SEA/SH and include the training into induction programs.
- All workers should sign a code of conduct which shall include specific clauses on GBV/SEA/SH prevention.
- Conduct awareness raising programs for neighboring communities regarding SEA/SH and reporting mechanism, including receiving channel of SEA/SH allegations.

(e) Impact on tangible heritage and cultural property:

The Shiva temple in Amrit Dada is nearby the RVT construction site, but it will not be directly affected during construction. However, to mitigate the impact on tangible heritage in Amrit Dada, fencing will be done to maintain the sanctity and aesthetic importance of the temple. Necessary mitigation cost for fencing with barbed wire has been proposed to preserve the cultural property. Likewise, a chance find procedure will be followed by the sub-project which will set out how chance finds associated with the sub-project will be managed.

(f) Impact on child and forced labor

Since both forced and child labor are forbidden under the Bheri Pumping sub-project, necessary arrangement will be done to comply with the standard as prescribed in LMP, which states:

- The risk of child labour will be mitigated through certification of laborer's age. This will be done by using legally recognized documents such as the National Identification Card, and Birth Certificate.

Furthermore, awareness sessions will be conducted among the communities to sensitize them on the prohibition and negative impacts of child and forced Labor. Local municipalities will continue to raise awareness against child labor and forced labor. Necessary action will be taken in coordination with the PIU and Ministry of labor in accordance with laws of Nepal if found that anyone has been forced into labor or child labor.

(g) Gender and Vulnerable Groups

Groups that are disadvantaged like the vulnerable group's voices are rarely considered in project preparation and construction. To ensure that their concerns are duly addressed and that the sub-project reaches out to these groups proactively, there is a need for SEP to be tailored to allow effective participation to voice their opinions and concerns. This may be done through following measures:

- Disclosing all critical project related information including on potential risks and impacts in culturally sensitive manner and in a language which can be easily understood.

- Timely and accessible consultations that utilize culturally appropriate communication tools.
- Gender-responsive consultation mechanisms ensuring that the concerns of women and men are equally heard and responded to.

In addition, the contractor will be encouraged to offer equal opportunity to local women and vulnerable and disadvantaged communities for construction and non-construction-related works, and also adopt non-discriminatory policy in wage distribution regardless of gender and caste. This would entail asking contractors to provide these vulnerable groups training that would be directly related to construction and maintenance of the facilities, like mason training, operation and maintenance training among others. In terms of GBV and SEA/SH risks, activities delineated in the SEA/SH action plans will be conducted separately with these vulnerable groups in a culturally sensitive manner.

Operation Phase

(a) Impact on water use rights of local people

No impact on the downstream users has been assessed due to the construction of the Intake and other facilities in Bheri river.

(b) Delivery of Unsafe Water

The mitigation measures for this impact include:

- Ensuring the correct operation of water treatment plant to meet satisfactory water quality as per NDWQS, 2022
- Providing safe storage for chemicals
- Ventilation of Housed dosing unit of chemical
- Train operators for handling chlorine for specific disinfectants

6.3.2 ENHANCEMENT MEASURES

Construction Phase

(a) Employment Generation

The enhancement measures for this beneficial impact will be as follows:

- Recommend contractors to employ local people by giving high priority to women and underprivileged groups as far as possible.

- Ensure equity in the provision of wages to both male as well as female laborers according to the law.

(b) Skill Enhancement

The enhancement measures for this beneficial impact will be as follows:

- Making a proper work plan and code of conduct during the construction period.
- Awareness on Occupational Health and Safety (OHS) (safety of machinery, use of protective equipment, safe handling and storage of chemical and hazardous material etc.) on the workplace environment.
- Provision of regular hands-on training to the workers during the project construction period (Hands-on training refers to software training that involves a practical element, where the user is able to learn how to use the software by trying it out for themselves in a controlled environment.)
- Provision of illustrative demonstration of practical element will be done for Dalit and Marginalized group who are not able to use the software.

Operation Phase

(a) Improved health and hygiene

The enhancement measures for this beneficial impact will be as follows:

- Water Safety Plan should be followed by respective sub schemes without interruption.
- Regular maintenance of water supply components should be done so that the project runs smoothly, and users are not deprived of benefits.

6.4 Implementation of Mitigation Measures

Most of the mitigation measures specified will be incorporated as part of the contractual obligations during the project construction and therefore will be integrated into the project design and tender documents. By including mitigation measures in the contract monitoring and supervision of mitigation implementation will be covered under the normal engineering supervision provisions of the contract. The mitigation measures implementation will be

monitored through direct observation, records of contractors, consultation with people etc. on a monthly, weekly or daily basis as required.

Project Design for implementation

For most of the adverse environmental impacts likely to occur during project construction and operational phase, mitigation measures have been integrated in the design of the project itself so as to strengthen the benefits and sustainability of the project. This will enhance the mitigation measures in terms of specific mitigation design, cost estimation of the mitigation measure, and specific implementation criteria. The proponent will ensure that the mitigation measures are included in the design of the project.

Project Contract

The project contract will clearly specify the mitigations measures that are part of the project construction, and the contractor will be bound by the parameters identified in the environmental assessment pertaining to specific mitigation measures. The proponent will ensure the compliance of the proposed measures from the contractor and the final acceptance of the completed work will not occur until the environmental clauses have been satisfactorily implemented.

Bill of Quantities

The tender instruction to the bidders will explicitly mention the site-specific mitigation measures to be performed, the materials to be used, labor camp arrangements, and waste disposal areas, as well as other site-specific environmental requirements.

6.5 Environment and Social Management Plan

n. Environment and Social Management Plan and Its Objective

The ESMP provides a description of the various environment and social management measures and their implementation arrangements during Construction & Operation Phases. The ESMP and responsibilities for its implementation have been described below.

The purpose of this Environmental and Social Management Plan (ESMP) is to ensure that the activities are undertaken in a responsible, non-detrimental manner with the objectives of:

- (ii) Providing a proactive, feasible, and practical working tool to enable the measurement and monitoring of environmental and social performance on-site;
- (iii) Guiding and controlling the implementation of findings and recommendations of the environmental and social safeguard assignment conducted for the project;
- (iv) Detailing specific actions deemed necessary to assist in mitigating the environmental and social impact of the project; and
- (v) Ensuring that safety recommendations are complied with.

A copy of the ESMP will be kept on work sites at all times. This ESMP will be included in the bid documents and will be further reviewed and updated during implementation. The ESMP will be made binding on all contractors operating on the site and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance. The basic objectives of the ESMP are to:

- To identify, assess, and mitigate potential adverse environmental and social impacts associated with the project activities during construction and operations.
- To engage with and incorporate the perspectives and concerns of stakeholders, relevant government agencies, NGOs, CBOs, indigenous groups including affected parties in decision-making processes related to the project.
- To ensure that all mitigation measures and monitoring requirements will actually be carried out at different stages of project implementation and operation;
- To recommend a plan of action and a means of testing the plan to meet existing and projected environmental and social problems;
- To establish the roles and responsibilities of all parties involved in the project's environmental and social safeguard management;
- To describe mitigation measures that shall be implemented to avoid or mitigate adverse environmental and social impacts, maximizing the positive ones;
- To ensure implementation of recommended actions aimed at environmental and social safeguard management and its enhancement; and
- To ensure that the environment and its surrounding areas are protected and developed to meet the needs of the local people, other stakeholders and safeguard the interests of the common people.

A Safeguard Unit of PIU in Birendranagar Municipality will be responsible for the project activities, and monitoring and evaluation of the project activities. PIU safeguard staff team will include Environment Officer, Social Development Officer and Social Mobilizers, and will be supported and monitored by the PMU. The PMU will provide technical assistance support in all aspects of project activities.

6.6 Institutional Arrangement

a. Executing and implementing agencies

The Ministry of Water Supply (MoWS) will be the executing agency with the responsibility of project execution delegated to the Project Management Unit (PMU)/ Water Sector Governance and Infrastructure Support Project (WaSGISP) of Department of Water Supply and Sewerage Management (DWSSM). Project Implementation Unit (PIU) of Birendranagar Municipality is the implementing agency.

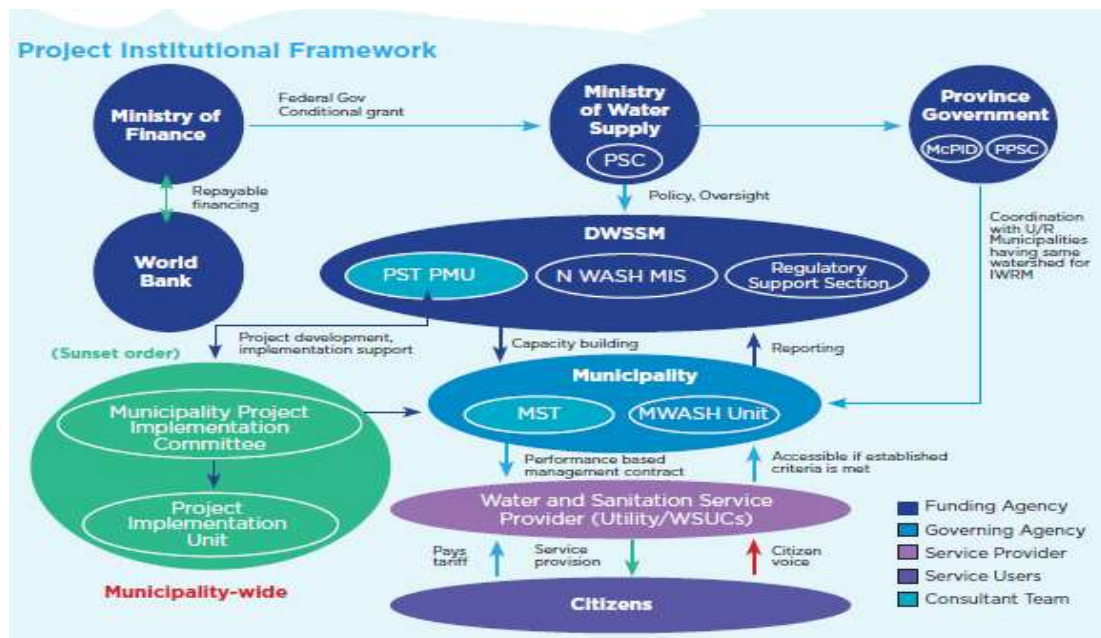


Figure 6-3: Overall Institutional Framework of WaSGISP

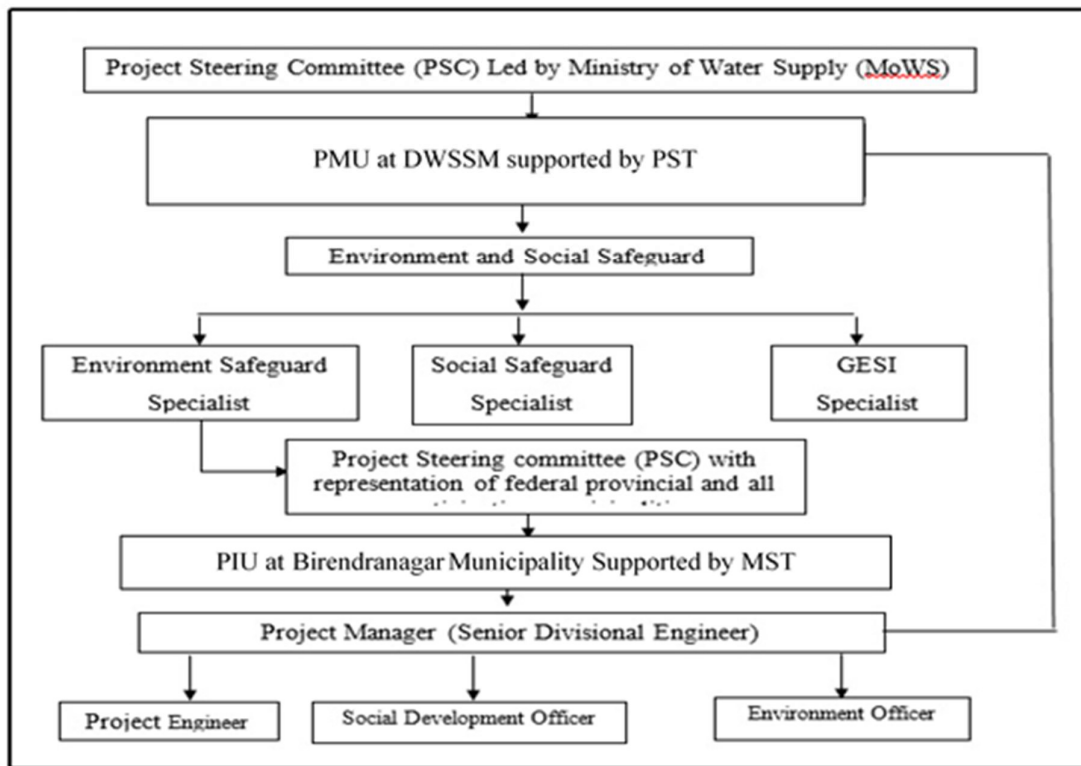


Figure 6-4: Organogram of E & S activities related to the project

The key responsibilities of the executing and implementing agencies are as follows:

Prior to construction:

Preparation of the environmental and social risk management instruments and get the *no objection* from the concerned authorities and the World Bank.

Safeguard Implementation Arrangement

Project Implementation Unit (PIU):

An Environment Officer will be engaged in PIU to ensure implementation of environmental safeguards. He/she will be provided with necessary consultant support, and capacity development and training. The responsibilities of the Environment Officer are as follows:

- Review and confirm existing IEEs and ESMPs are updated based on detailed designs, IEEs/ESMPs prepared by PMU comply to exclusion criteria and design guidelines as stipulated in the ESMF and government rules; and recommend the documents for approval to PMU
- Approve sub-project environmental category;

- Ensure that ESMP is included in bidding documents and civil works contracts;
- Provide oversight on environmental management aspects of sub-project and ensure ESMP is implemented by contractors;
- Establish a system to monitor environmental safeguards of the project including monitoring the indicators set out in the monitoring plan of the ESMP;
- Facilitate and confirm overall compliance with all Government rules and regulations regarding site and environmental clearances as well as any other environmental requirements as relevant;
- Supervise and provide guidance to the PIU to properly carry out the environmental monitoring and assessments as per the ESIA
- Review, monitor and evaluate effectiveness with which the ESMPs are implemented, and recommend necessary corrective actions to be taken;
- Consolidate monthly environmental monitoring reports from PIU and submit semi-annual monitoring reports to PMU
- Ensure timely disclosure of final IEEs/ESMPs in project locations and in a form accessible to the public;
- Address any grievances brought about through the Grievance Redress Mechanism (GRM) in a timely manner as per the IEEs/ESIA; Ensure smooth functioning of the GRM system
- Undertake regular review of safeguards-related compliance during program implementation; and
- Organize periodic capacity building and training programs on safeguards for project stakeholders, PIU, WSUC and Contractor
- Support the PMU in reporting and implementation of the ESIA, ESCP and SEP.

The Social Development Officer will be a part of PIU team and will be responsible for day-to-day activities related to the project. S/he should be responsible and take full ownership for the following scope of work;

- Community Engagement: Act as a liaison between the project team and the local community, ensuring that the community is involved in the decision-making process and that their concerns and needs are addressed.
- Work in close collaboration with Environment and other Experts in PIU for implementation of requirements outlined in the ESMF/IEE and other safeguard documents prepared for the project
- Review and confirm existing IEEs and ESMPs are updated based on detailed designs, that IEEs/ESMPs prepared by PMU comply to exclusion criteria and design guidelines as stipulated in the ESMF and government rules; and recommend for approval to PMU
- Ensure that the social safeguard provisions are adhered to and compliance monitoring has been done as per the ESIA and other safeguards reports. Also review, monitor and evaluate effectiveness with which the ESMPs are implemented, and recommend necessary corrective actions to be taken
- ensure timely disclosure of final IEEs/ESMPs in project locations and in a form accessible to the public
- Coordinate with the PIU and gender focal person in the PMU to implement SEA/SH actions plan and ensure the targets of the project is achieved on a timely manner.
- Support to implement the Grievance Redress Mechanism (GRM) and its handling procedures, channels based on the ESIA and prepare GRM database in order to ensure that all registered complaints are addressed properly
- Facilitate capacity building programs for the local community to enhance their understanding of the project, its benefits, and any changes or challenges it may bring. This can include training programs, workshops, and awareness campaigns. Additionally, also carry out capacity building programs for the PIU, contractors and WSUC
- Facilitate communication and coordination with stakeholders and local communities based on the SEP which outlines key messages and channels for communications to be communicated. Also conduct consultative meetings with relevant stakeholders to discuss site specific social issues of project and get feedbacks from the participants to address it in a systematic manner
- Consolidate monthly environmental monitoring reports from PIU and submit semi-annual monitoring reports to PMU

- Continuously monitor the social impacts of the project and evaluate the effectiveness of social development initiatives. This will help in making necessary adjustments to the project plan to ensure that it remains aligned with the community's needs and expectations

A Social Mobiliser under direct supervision of the social safeguard specialist and overall supervision of the PIU, will provide support to the implementation of following project activities.

- Conduct community assessments and identify key stakeholders and community leaders to engage in the project.
- Assist the social safeguard specialist to develop and implement a comprehensive community mobilization strategy to raise awareness about the importance of clean water and the benefits of the project.
- Assist the social safeguard specialist to organize and facilitate community meetings, workshops, and training sessions to educate community members about water conservation, sanitation, and hygiene practices.
- Assist the social safeguard specialist in implementing the SEP and also aid in community participation for regular communication and engagement activities.
- Collaborate with local authorities, non-governmental organizations (NGOs), and other relevant stakeholders to ensure the effective coordination and implementation of project activities.
- Support the PIU for the establishment of community-based water management committees to oversee the maintenance and sustainability of the water supply infrastructure.
- Monitor and evaluate the impact of community mobilization efforts and provide regular reports to the PIU.
- Identify any challenges or concerns raised by the community in relation to the water supply project and inform the social safeguards specialist.
- Assist in the development of communication materials such as pamphlets, posters, and audiovisual aids to support community mobilization activities.

Project Support Team (PST)

The Project Support Team (PST) will provide support to the PMU in the following areas:

- Ensure that the quality of the designs and construction of all water supply and sanitation components implemented under the sub-project are to the required standards;
- Assist the PMU with the overall planning, implementation and monitoring of the project during all stages of implementation including adherence to all environmental and social safeguards' requirements;
- Liaise with other government and non-government agencies at the federal, provincial and local Government to implement the ESIA and other management documents including the ESCP and SEP

Municipality Support Team (MST)

Municipality Support Teams (MSTs), hired by the PMU, will support the PIUs in the participating municipalities for design and supervision support comprising expertise in technical/engineering, governance, FM, procurement, M&E, gender and social inclusion, and E&S safeguards, implementing the infrastructure sub-project and institutional strengthening activities. The MST will ensure that institutional and technical support provided is fully institutionalized in the municipal structure. MST will also strengthen the internal capacity of the Municipality to adequately plan, implement, deliver, self-regulate as well as sustain these functions into the mainstream Municipality organization through the introduction and application of necessary governance and policies, directives and guidelines, and operationalization of safe water and sanitation services.

Water Users' and Sanitation Committee and Birendranagar Municipality

Birendranagar Municipality Office is the eventual operator of the completed sub-project. The key tasks and responsibilities of the Water Users' and Sanitation Committee and the municipality are, but are not limited to;

Before Construction

- WSUC facilitates public consultation and participation, information dissemination, and social preparation.

- The municipality will assist in securing tree-cutting permits, and provide required permits like land permits, RoW permit, etc.
- All Community Forest User Committees will provide necessary consent to the use of forest resource for the construction of Bheri Pumping Sub Project.
- Both WSUC and municipality will provide available data to the DPR team during Detailed Project Report preparation, and will participate in & facilitate training programs.

During Construction & Operation

- WSUC will support the contractor to ensure quality works, and will facilitate the GRM.
- WSUC will actively participate in the monitoring of the Contractor's compliance.

ESMP of ESIA report

- During later phase, WSUC will coordinate in community level, while municipality office will undertake the overall operation and maintenance of the sub-project.
- WSUC will facilitate municipality office to coordinate with the stakeholders.

Civil Works Contractor

Contractor is to carry out all environmental and social mitigation and monitoring measures outlined in their contract. The contractor will be required to submit to PIU, for review and approval, a site-specific environmental and social safeguard management plan (C-ESMP) including (i) proposed sites/locations for construction work camps, storage areas, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved ESMP; (iii) monitoring program as per C-ESMP; (iv) budget for C-ESMP implementation, and a dedicated staff (EHS focal person) for implementation of the C-ESMP.

6.7 Environment and Social Management Plan Matrix

The ESMP matrices are based on the identified impacts, possible mitigations discussed with the stakeholders. The following tables show the details of environmental and social management works with cost details, along with roles and responsibilities for the proposed activities;

Table 19: Environment Social Management Plan (ESMP) Matrix

Field/ Impact	Mitigation Measures	Activities	Sites/Location	Time of Implementation	Methods	Responsible Party	Estimated Resources	Monitoring and evaluation
Construction Phase								
Employment	Employment priority to locals	Locals especially backward communities will be given priority	Birendranagar Municipality ward nos. 1, 2, 3, 4, 6, 8, 9, 10, 11 and 12 and Lakebesi Municipality Ward no 10	During construction phase	In coordination with local stakeholders and authorities	Contractor		Birendranagar Municipality, PIU, PMU
Skill Enhancement	Locals will be given priority on the Job training	Establishing provision of regular hands-on training to the workers during the project construction period. Training on skilled workers.	Birendranagar Municipality ward no. 1, 2, 3, 4, 6, 8, 9, 10, 11 and 12 and Lakebesi Municipality Ward no 10	During the early construction phase	Contractual provisions will be established	Contractor	In BOQ	Birendranagar Municipality, PIU, PMU
Enhanced local trade & business opportunity	Local trade and business will be enhanced	The contractor will be recommended to give priority to the local products during the procurement of	Lakebesi Municipality Ward no 10, Birendranagar Municipality ward no 11	During the construction phase	Contractual provisions will be established	Contractor		Birendranagar Municipality, PIU

Field/ Impact	Mitigation Measures	Activities	Sites/Location	Time of Implementation	Methods	Responsible Party	Estimated Resources	Monitoring and evaluation
		the construction materials						
Operation and Maintenance								
Health & hygiene	Improved health and hygiene	Regular maintenance of the water supply components should be done so that the project operates smoothly and the benefits are intact.	Lakebesi Municipality Ward no 10, Birendranagar Municipality ward no 11	During the contractor's O & M Phase	In coordination with local CBOs	Contractor	In Bill 1 of BOQ	Birendranagar Municipality, PIU
Increased economic opportunity	Promoting urbanization through proper land development activities in the project area	Coordinate with the enterprises	Birendranagar Municipality ward no. 1, 2, 3, 4, 6, 8, 9, 10, 11 and 12 and Lakebesi Municipality Ward no 10	During the contractor's O & M Phase	Number of site visits State of properly and legally planned land use	Contractor		Birendranagar Municipality, PIU
Social empowerment	Priority will also be given to vulnerable groups in WSUC along with female groups.	Capacity-building training will be provided to underprivileged groups of people, especially women and poor people in various capacity-building programs and involved in the community meeting	Birendranagar Municipality ward no. 1, 2, 3, 4, 6, 8, 9, 10, 11 and 12 and Lakebesi Municipality Ward no 10	During the contractor's O & M Phase	Site visits and public consultation	Contractor, PIU	In Bill 1 of BOQ	Birendranagar Municipality, PIU
Construction Phase								
Physical Aspects								
Air Pollution	Reduce the air pollution	water will be sprinkled in all the	At construction sites	Regular practices Every day/month		Contractor	In Bill 1 of BOQ	Birendranagar Municipality, PIU

Field/ Impact	Mitigation Measures	Activities	Sites/Location	Time of Implementation	Methods	Responsible Party	Estimated Resources	Monitoring and evaluation
		gravel and earthen road section that passes through the settlement and proposed infrastructure site at least two times a day during transportation of construction material, it should have tarpaulin cover. Open burning of garbage will be strictly prohibited by issuance of notice and awareness	At access road At labor camps	As per need				
Landslides in transmission line	Slope protection works	Retaining wall & Bioengineering	Along Shiva Shakti Community Forest section	Before pipeline laying	Civil works	Contractor	In Bill 1 of BOQ	Birendranagar Municipality, PIU
Land Surface disturbance and degradation	Proper land management	The excavated material should be safely disposed with proper back filling. Construction activities should be avoided during rainy season	At construction sites	Regular practices day		Contractor	In BOQ	Birendranagar Municipality, PIU
Noise pollution	Control noise levels	Noise generating construction activities like vehicular	Construction sites Access road	During operation of heavy equipment's and vehicle		Contractor	In Bill 1 of BOQ	Birendranagar Municipality, PIU

Field/ Impact	Mitigation Measures	Activities	Sites/Location	Time of Implementation	Methods	Responsible Party	Estimated Resources	Monitoring and evaluation
		movement will be limited to day time Using equipment that emit the least noise, well maintained and with efficient mufflers						
Generation of solid waste and waste from construction sites and worker's camp	Adopt best Waste management practices (3R Practices)	Waste minimization and waste segregation will be prioritized Practices of composting will be promoted Containment of hazardous waste will be carried out Awareness raising event will be carried out	Construction sites Labor camps	Every week at labor camps Regularly at active working sites		Contractor	In Bill 1 of BOQ	Birendranagar Municipality, PIU Monthly monitoring
Impact on water bodies	Precautionary measures to reduce pollution at the source Monitoring of water quality	The location of stockyards for construction materials shall be identified at least 300m away from the water courses. The place for storage of fuel and lubricants will be away from any drainage leading to water bodies Earthworks generating a higher amounts of	At the proposed construction sites	During the construction phase	Laboratory water analysis Monthly water quality analysis	Contractors	In Bill 1 of BOQ	Birendranagar Municipality, PIU Monthly monitoring

Field/ Impact	Mitigation Measures	Activities	Sites/Location	Time of Implementation	Methods	Responsible Party	Estimated Resources	Monitoring and evaluation
		spoil will be conducted during the dry season to avoid the difficult condition that prevails during monsoon season such as problems of runoff						
Disruption of natural Drainage	Avoid natural drainage pathways for pipe-laying works	Stockpile the excavated material at a safe but nearby place Restored natural drainage system if the drainage system during the construction is blocked	At the proposed construction sites	During the construction phase	Site Inspection	Contractors	In BOQ	Birendranagar Municipality, PIU Monthly monitoring
Operation Phase								
Impact on water pollution	Polluted water should be treated properly before releasing into the water source	The effluent from the WTP and wastewater should be well treated before releasing into the water surface.	Bheri, Jhupra River	During the Operation phase	Site Inspection	Contractors	In BOQ	Birendranagar Municipality, PIU Monthly monitoring
Biological Aspects								
Impact due to loss of vegetation, forest, and forest products due to site clearance	Compensatory plantation	Greenery promotion around the construction sites. Necessary approval will be taken from the relevant	Rani Chau Tari Community Forest, Shiva Shakti Community Forest, Bheri Community Forest and	During 1 st plantation season of the project	In coordination with the DF O Surkhet	Contractor	In Bill 1 of BOQ	Birendranagar Municipality, Lakebesi Municipality and DFO

Field/ Impact	Mitigation Measures	Activities	Sites/Location	Time of Implementation	Methods	Responsible Party	Estimated Resources	Monitoring and evaluation
		authorities and compensatory plantation at 1:10 will be carried out Trees of local economic value and aesthetic significance will be planted under compensatory plantation	Aishwarya Community Forest					
Management of falling trees		Around 1786 trees will be fallen down (Tree and Pole) in the construction sites	Rani Chau Tari Community Forest, Shiva Shakti Community Forest, Bheri Community Forest and Aishwarya Community Forest	During 1 st Phase of the project implementation	The felling tree will be collected pile up and handed over to DFO Surkhet,	Contractor	For the management of felled trees (pile up and transportation from the project area) Rs. 3 lakhs will be allocated.	Birendranagar Municipality, Lakebesi Municipality and DFO
Forest land Compensation			In coordination with DFO Surkhet and Birendranagar Municipality	During the 1 st phase of the project implementation	Forest land purchase as per Forest Regulation 2079. Schedule (51) Rule (93) Sub Rule 1 & Rule (95) Sub Rule 3	PIU	In Bill 1 of BOQ	The forest area will be regularly monitored by the Division Forest Office, Surkhet, and forest encroachment and other illegal activities (poaching, fire) in the forest area will be controlled. Workers and builders, who live in camps in the

Field/ Impact	Mitigation Measures	Activities	Sites/Location	Time of Implementation	Methods	Responsible Party	Estimated Resources	Monitoring and evaluation
								project area, will not be allowed to use firewood from the forest area.
Deforestation	Establishment of Nursery	Purchase of Instrument and establishment of Nursery	In consultation with DFO	During 1 st and 2 nd phase of the project implementation		Contractor in consultation with PIU and DFO Office	In Bill 1 of BOQ	Birendranagar Municipality, PIU and DFO Office Surkhet
Increased pressure on the surrounding forest for its products like firewood, timber and non-timber forest products	Minimize the use of forest product	Collection of NTFP will be restricted during the construction of different infrastructure in the community forest area	Ranichautari, Bheri ganga, Shiva Shakti and Aishwarya Community Forest Access Road	During construction	Site inspection and frequent monitoring Provision of penalizing	Contractor		Birendranagar Municipality, PIU Monthly monitoring, DFO Surkhet Monthly Monitoring
Disturbance to wildlife habitat and movement due to construction-related activities	Code of conduct for vehicles and workers during the construction related activities	The speed limit will be enforced and blowing horns will be prohibited in the project access passing through the forest area Unnecessary lighting and bright light will be avoided. use of loud speakers will be banned in the worker's camp	Ranichautari, Bheri ganga, Shiva Shakti and Aishwarya Community Forest Access Road	During construction	Site inspection and frequent monitoring Provision of penalizing	Contractor		Birendranagar Municipality, PIU Monthly monitoring, DFO Surkhet Monthly Monitoring
Operation Phase								
Impact on aquatic life		Strict Monitoring on the daily	At the proposed construction sites	During the construction phase	Site Inspection	Contractors		Birendranagar Municipality, PIU

Field/ Impact	Mitigation Measures	Activities	Sites/Location	Time of Implementation	Methods	Responsible Party	Estimated Resources	Monitoring and evaluation
		activities of workers Provision of temporary but well-equipped toilets Restriction to workers from fishing Adopt measures mentioned for the solid waste management						Monthly monitoring
Impact on Socioeconomic and cultural environment								
Construction Phase								
Permanent and temporary land acquisition and related compensation issues								
Changes in social structure cultural and traditional practices of the rural people due to exposition to the outside workforce		Workforce will be informed about the culture and living style of the project area. They will be instructed to respect the locally accepted culture and living style. Special instruction will be given to all workers to act in responsible manner during and after working	At the proposed construction sites	During the construction phase	Site Inspection	Contractors	In BOQ	Birendranagar Municipality, PIU Monthly monitoring

Field/ Impact	Mitigation Measures	Activities	Sites/Location	Time of Implementation	Methods	Responsible Party	Estimated Resources	Monitoring and evaluation
		hours, respecting the rights, properties and practices of local people						
Conflict between local and outside workers and erosion of law-and-order situation of the project area		Preference will be given to the local people in project related jobs and subsidiary opportunities. Construction workers from outside the project area will be well-informed about the general norms and values of society before deployment. The construction workforce will be instructed to respect local people, especially the female members and the local culture and tradition.	At the proposed construction sites	During the construction phase	Site Inspection	Contractors		Birendranagar Municipality, PIU Monthly monitoring
Community health and safety hazard		Safety sign boards and caution boards will be placed at labor camps, stock-piles sites, and spoil disposal sites.	At the proposed construction sites	During the construction phase	Site Inspection	Contractors	In Bill 1 of BOQ	Birendranagar Municipality, PIU Monthly monitoring

Field/ Impact	Mitigation Measures	Activities	Sites/Location	Time of Implementation	Methods	Responsible Party	Estimated Resources	Monitoring and evaluation
		Active sites will be well demarcated and bounded. Excavated sites will be well bounded with hard barricades. Unauthorized entry to active construction sites and stockpile sites will be strictly regulated. Movement of vehicles for construction activities will be strictly regulated under safety guidelines. Code of conducts will be implied for the workforce so that they have no conflict with the local communities.						
Issues of prostitution and STDs		The prohibitory law against human trafficking and prostitution will be strictly enforced and local security force a, as well as concern	At the proposed construction sites	During the construction phase	Site Inspection	Contractors	In Bill 1 of BOQ	Birendranagar Municipality, PIU Monthly monitoring

Field/ Impact	Mitigation Measures	Activities	Sites/Location	Time of Implementation	Methods	Responsible Party	Estimated Resources	Monitoring and evaluation
		community, will be informed about the need of effective surveillance. The deprived and vulnerable people will be given priority in employment in the project. Similarly, workers as well as the local people will be made aware about STDs and the protective measures as well as the prohibitory law and the provision of punishment in case of law breaching.						
Occupational health and safety hazard		The contractor will be informed to adopt safe construction practices to minimize construction related accidents and possible health consequences. Construction workers will be	At the proposed construction sites	During the construction phase	Site Inspection	Contractors	In Bill 1 of BOQ	Birendranagar Municipality, PIU Monthly monitoring

Field/ Impact	Mitigation Measures	Activities	Sites/Location	Time of Implementation	Methods	Responsible Party	Estimated Resources	Monitoring and evaluation
		trained in job hazards, emergency procedures and in any other relevant safety measures. The occupational workers engineer and supervisors working at the active construction sites will be provided with air masks, helmets, safety goggles, ear plugs, gloves and boots.						
Labor Influx	<p>a) Preparation of code of conduct and its effective implementation</p> <p>b) Strict prohibition of child labor</p> <p>c) Equal wages for both male and female</p> <p>d) Prioritize the recruitment and training of local workforce to maximize local employment opportunities.</p> <p>e) Regularly monitor labor conditions, health and safety standards,</p>	<ol style="list-style-type: none"> 1. Training and awareness on child labor, SEA/SH 2. Code of conduct 3. Explanation of the provisions of the LMP 	Workplace environment	During the construction phase	Site inspection	Contractor (responsible for following Code of Conduct),PIU and Birendranagar Municipality	In BOQ	Birendranagar Municipality, PIU Monthly monitoring

Field/ Impact	Mitigation Measures	Activities	Sites/Location	Time of Implementation	Methods	Responsible Party	Estimated Resources	Monitoring and evaluation
	social impacts, and environmental performance. Establish mechanisms to address non-compliance and take corrective actions as necessary.							
Operation Phase								
Impact due to compliance deficiencies of water quality parameters	The KPIs shall be defined and strictly complied	Providing safe storage of chemicals Testing of water quality as per the NDWQSID, 2022 Ensuring the correct operation of the water treatment plant to mandatory requirement of NDWQS, 2022	At the Outlet of the treatment plant, outlet of reservoir	During the operation phase	WQ monitoring	Contractor/Municipality	Contractor cost has been incorporated in technical report, included in KPI of operation phase.	Birendranagar Municipality, PIU Monthly monitoring
Impact on gender and vulnerable Groups		The project will offer equal opportunity to local women and vulnerable and disadvantaged communities in operation maintenance	At the proposed construction sites	During the construction phase	Site Inspection	Contractors		Birendranagar Municipality, PIU Monthly monitoring

Field/ Impact	Mitigation Measures	Activities	Sites/Location	Time of Implementation	Methods	Responsible Party	Estimated Resources	Monitoring and evaluation
		works and adopt a nondiscriminatory policy in wage distribution regardless of gender and caste						

Total cost of **NRs. 190,451,919.19** has been allocated for ESMP works and this will be incorporated into the civil works contract. PIU team will supervise and monitoring for the timely and proper implementation of the ESMP works outlined. The contractor will need to depute an Environment focal person and submit a Site-specific ESMP document before start of the construction works.

CHAPTER 7

Rapid Cumulative Impact Assessment

The cumulative impact of the project is the incremental impact of the project when added to impacts from other relevant past, present and reasonably foreseeable developments as well as unplanned but predictable activities enabled by the project that may occur later or at a different location. Cumulative impacts can result from individually minor but collectively significant activities taking place over a period of time (*World Bank ESF, 2016*)⁸.

As part of the impact assessment process, a Rapid Cumulative Impact Assessment (RCIA) was conducted to assess the potential impact of the sub-project when considered in conjunction with existing, planned, and proposed projects. The aim was to provide an evaluation of the likely significance of cumulative impacts.

7.1 Rapid Cumulative Impact Assessment Process

The primary objective of this RCIA is to identify potential issues that may arise as a result of the Bheri Pumping Sub-project when considered within the context of existing, planned, and reasonably predictable future developments. The RCIA study involves a collaborative effort, including consultation with local experts, government officials, and guidance from experts in Cumulative Impact Assessment (CIA). It also entails the collection of additional data and an extensive review of relevant literature. The outcomes of the RCIA comprise recommendations at both the project-level and strategic planning level. These recommendations aim to minimize adverse impacts and maximize positive effects associated with water supply and sanitation, as well as other development activities within the Surkhet Valley watershed.

The rapid assessment of cumulative impacts by the Bheri Pumping sub-project follows a structured approach, encompassing the following key steps:

- Defining the geographical boundaries for assessing the cumulative impacts caused by the Bheri Pumping Sub-project.
- Establishing the temporal boundaries for cumulative impact assessment. This involves conducting both an "as is" analysis, examining the current status, and an

⁸ 2016." World Bank Environmental and Social framework." World Bank, Washington, DC

"as if" analysis, which explores potential future development scenarios for projects similar to WASH activities in the Surkhet valley, spanning a timeframe of up to 10 years. This analysis includes assessing the numbers and basic technical parameters of these projects.

The RCIA approach was centered on addressing key Environmental and Social (E&S) concerns specific to the sub-project and its potential cumulative effects. These concerns were identified through consultations with affected communities and key stakeholders during the Rapid Screening process for the need for a Cumulative Impact Assessment in the Surkhet Valley in February 2023. The assessment considered how the sub-project, in conjunction with other development activities in the Surkhet Valley watershed, including but not limited to the Kohalpur-Surkhet 132 KV transmission line project and the Bheri Babai Diversion Multipurpose Project (BBDMP), could impact the area.

7.2 Environmental and Social Concerns

In February 2023, the Project Management Unit (PMU) conducted a rapid overview of E&S aspects to determine the need for a Cumulative Impact Assessment (CIA) in the Surkhet Valley watershed. Key E&S concerns associated with project activities in the Surkhet Valley were identified during this assessment. These concerns include:

- Potential Impacts on Air, Noise, and Water Quality and Quantity
- Potential Impacts of Landslides and Erosions
- Potential Impacts on Forests and Vegetation
- Potential Impacts on Wildlife and Aquatic Life
- Potential Impacts of Land Acquisition for Civil Construction, Resulting in Economic and Physical Displacement
- Potential Impacts on Indigenous and Marginalized Communities and Cultural Heritage

Extensive consultations were conducted with various stakeholders, including local, provincial, and federal government agencies, to address these concerns. A rapid screening was conducted to evaluate potential cumulative impacts against key E&S concerns. The results of this screening are presented in Table 20. The primary environmental and social concerns, referred to as Valued Environmental and Social Components, regarding potential cumulative effects of other projects, can be summarized as follows:

- a) Water Quality and Quantity
- b) Forest and Ecology

Table 20: Screening of Potential/ Key E&S Aspects/ Concerns for CIA

E&S Aspect/ Concern	Impacted by WaSGISP	Impacted by other projects and stressors	Justification, comments
Air Quality	Yes	No potential for cumulative impacts	There is negligible potential for significant cumulative air quality impacts (e.g., from fugitive dust) from the project activities in the valley. During the construction phase, the impact from the project to air quality is temporary, limited to the vicinity of construction activities, and unlikely to extend far. WaSGISP is unlikely to have impact on air quality during operation phase. Subproject's ESMP will have measures to mitigate construction stage limited risks/ impacts. Hence, WaSGISP is unlikely to cause significant cumulative impacts on air quality in the Surkhet Valley.
Noise	Yes	No potential for cumulative impacts	There is negligible chance for cumulative noise impacts resulting from project activities. Noise impacts from project activities, particularly from the construction works, are typically low level (given the nature of small-scale civil works), temporary, limited to the construction phase and in the vicinity of the construction sites. Subproject's ESMP will have measures to mitigate this.
Water quantity and quality	Yes	Yes, partial	The water quality and quantity in the Surkhet Valley may be affected. The project is being implemented for sustainable water supply and sanitation. Implementation of WaSGISP activities is expected to have significant public health and environmental benefits by limiting sewage flooding and discharge of untreated effluents in drainage systems. Water quality impacts from project activities are typically temporary, limited to the construction phase

			<p>Therefore, project impacts on water quality will be negligible. In fact, activities to improve sanitation (such and faecal sludge/sewage treatment) is likely to have positive impacts on the water quality. (See further description at Section 7.1).</p> <p>The project will make use of water from different sources. The existing community water supply schemes will be consolidated and improved – which use the existing sources. The main additional source is the Bheri River. The amount of water that will be used from the Bheri River is minimal compared to the dry-weather flow.</p>
Landslide and erosion	Partially	No potential for cumulative impacts	The Project activities are mainly in the relatively flat terrain and any impacts of landslides/soil erosion will negligible and will be limited during construction, which could be mitigated through site specific measures.
Forest and Ecology	Yes, near footprint areas	Yes	Some project activities (Bheri sub-project’s components) likely to be located/constructed in the forest areas (Community Forests) and may impacts forest areas. These could be mitigated through subproject mitigation measures. The E&S Planning and Design Guidance provided in the ESMF will help avoid and minimize adverse impacts to the extent possible. (See Section 7.2 for further details)
Aquatic life	Partially	No potential for cumulative impacts	The ESMF require that the water intake structure to be used will not have barrier across the river which affects movement of fishes/ aquatic life. The water intake at river, where needed, will be side intake, meaning it will not be built across the river. It will be built on the one bank of the river. There will be no dam or barrage or weir covering the whole width that impede fish migration.

Loss of Land, change in land use	Yes	No potential for cumulative impacts	Most of the project activities will be on government managed land such as Right of way of the Road. Impact on private land (agricultural land) will be limited and temporary. Disruption of access to land related resources will be temporary.
Indigenous and marginalized communities	Yes	No potential for cumulative impacts	The sub-projects that require FPIC has been included in the exclusion list. Impacts on the IPs and marginalised communities during the construction, operation and maintenance phases will be limited and manageable. Influx of labour is expected to be limited. Site specific mitigation measures will be prepared and implemented.
Cultural heritage	Yes	No potential for cumulative impacts	Impacts on cultural heritage will be negligible. The Project will not support activities that would result in demolition of structures or sites that have cultural, historical or religious value to the community.

Source: Rapid Screening for the need for Cumulative Impact Assessment (CIA) of Surkhet Valley, February 2023

7.3 Current Development Status of Surkhet Valley Watershed

As of today, development activities in the Surkhet Valley have been ad-hoc and primarily guided by individual efforts of interested groups and individual developers. Birendranagar is urbanizing rapidly but in a largely unplanned manner. Planning is limited to addressing immediate community needs, such as water supply, trail development, extension of rural motorable roads, small-scale irrigation, etc., and lacks medium to long-term strategic objectives. There are no known development plans for the foreseeable future.

The city lacks a sewerage system and relies entirely on on-site pits, tanks, and informal de-sludging. The municipality has only one functional Fecal Sludge Treatment Plant (FSTP). The Surkhet Valley Water Users Committee (SVWUC) manages and operates water and sanitation services in the urban core of Birendranagar. SVWUC is a consumer-controlled non-profit organization, with all consumers subject to volume-based water tariffs based on metered consumption.

7.3.1 Existing Water Supply and Sanitation Situation

To meet the increasing demand for drinking water in Surkhet Valley, the Jhupra Brihat Khanepai Aayojana was built in 2000, now known as the Surkhet Valley Water Users Committee (Surkhet Upatyaka Khanepani Sanstha) since 2017. SVWUC, which primarily relies on water from the Jhupra River, has also incorporated water from Itaram, Khorke, and Khari-Bori Rivers into the system (Figure 7.1). Due to population growth and a declining trend in water sources, the existing system struggles to supply water as per demand. Currently, SVWUC can only provide 149 liters per second during normal seasons, which reduces to 99 liters per second in the dry season. Considering the ever-increasing population, the municipality has identified the Bheri River as an alternative source of drinking water. As per the DPR, the present source of SVWUC is river discharge as well as under-ground water for Surkhet valley. The Water Production per day in Cum/d for Jhupra river is 3888, Khari river is 2592, Itaram river is 864, Khorke river is 432 and Bulbule Sumpwell is 288 and the total dry season flow from river and ground water is about 8064 cum/day.

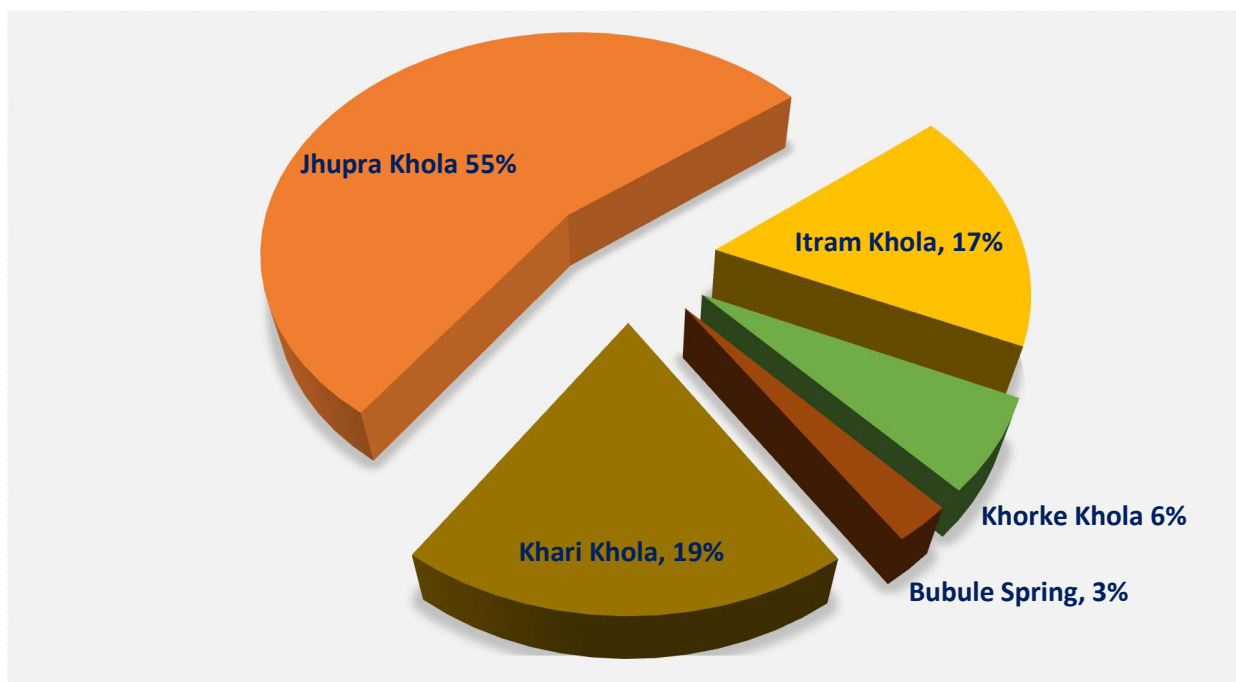


Figure 7-1: Proportion of water withdrawal from different sources in Surkhet Valley

7.3.2 Existing Fecal Sludge Treatment Facilities in Birendranagar Municipality

SNV Nepal has supported Birendranagar Municipality in constructing Fecal Sludge Treatment Facilities (FSTF). These facilities have been built in Tarebhir within the Krishna Community Forest area of Birendranagar Municipality-1. The FSTF offers safe treatment and disposal of human excreta services to the city's residents. The Fecal Sludge Treatment Plant (FSTP) has a design capacity of 50 cubic meters of fecal sludge per day and a lifespan of 15 years. It is equipped with treatment components, such as separating solids and liquids, treatment and reuse of products, a screening unit, a vertical flow constructed wetland, compost curing houses, and composting units. This FSTP has been providing services to the city since September 30, 2021."

7.3.3 Other Development Sectors

Currently, the following Projects are under implementation in Surkhet Valley

- Kohalpur- Surkhet 132 KV Transmission Line Project
- Bheri Babai Diversion Multipurpose Project (BBDMP)

Brief characteristics of each of these Projects has been provided below.

Kohalpur- Surkhet 132 kV Transmission line project

The installation of a 132 kV transmission line in Surkhet district, originating from Kohalpur in Banke district, is being pursued as a remedy to address the prevailing low voltage issues stemming from the existing 33 kV transmission line. The current 33 kV supply line, in operation since 1988, has become inadequate to cater to the escalating electricity demands of the region. The proposed transmission line intersects with the WaSGISP Project area within three community forests, necessitating the removal of trees to clear the Right of Way (RoW) for the 132 kV line. The objective behind upgrading the transmission line to 132 kV is to resolve the low voltage problems and enhance the overall electricity supply in the Surkhet district.

To commence construction, the Project has conducted the EIA study and obtained the necessary permits to ensure that the project complies with national environmental regulations. The project has also successfully secured the requisite approvals from the Ministry of Forest and Environment (MoFE) to facilitate RoW tree removal along the transmission line route.

Bheri Babai Diversion Multipurpose Project (BBDMP)

The Bheri Babai Diversion Multipurpose Project (BBDMP) is a major national priority project in Nepal. Currently the project is under Construction and it is situated around 12 kilometers upstream from the side intake of the Bheri pumping sub-project. The primary objective of the BBDMP is to address the seasonal fluctuations in water availability in small and medium rivers. These rivers often experience abundant flow during the wet months of June to September but significantly lower or even dry conditions during the remaining months.

The BBDMP is designed as an inter-basin transfer project. The project has been optimized for a diversion discharge of 40 m³/s, primarily focusing on minimizing the potential long-term environmental effects on the aquatic ecosystem of the Bheri and Babai Rivers. By diverting this amount of water, the project aims to provide year-round irrigation to approximately 51,000 hectares of agricultural land.

The BBDMP is an important initiative that aims to enhance water availability and ensure a more reliable water supply for agricultural purposes. By addressing the seasonal fluctuations in river flow, the project aims to revitalize interest in agricultural farming and contribute to the country's food security.

7.4 Future Development Projections for the Surkhet

Currently, Government of Nepal (GoN) has launched a 6-year long Water Sector Governance and Infrastructure Support Project (WaSGISP) from September 2022 with support from the World Bank. Since the project is a municipality-wide approach with all three tiers of government co-financing, for the upcoming six years till the project's effectiveness, all the WASH-related activity in the project municipalities will be done through this project. A climate Resilience WASH plan will be prepared by respective municipalities and based on the findings and recommendations of these plans; construction activity will be done following the bank guidelines. The implementation modality will be through the federal, provincial and local levels. As per the consultation with the relevant stakeholders of Surkhet valley, there is no other WASH Project or a confirmed plan to launch new projects for water supply and sanitation sector in the Surkhet Valley by any of the three tiers of the GoN (municipality, province, and federal) in the coming next 10 years. The Federal Ministry of Finance (MoF) provide funds to Provinces and Municipalities through various grants. Such grants to the WASH sector are planned and coordinated through Ministry of Water Supply (MoWS) and DWSSM. MoWS/ DWSSM has no other plan, beyond the WaSGIP, to support WASH activities in the Surkhet Valley until the period in which WaSGISP remains effective.

The core concept of WaSGISP is the implementation of its activities through municipality wide approach. The project will be implemented on a co- financing model with the involvement of all three tiers of the government (federal, province, and municipality). Consequently, all the resources, including financing, planned by federal, provincial and local level authorities to WASH Sector are expected to be channelized through this project (WaSGIP). DWSSM is the only implementing agency working in the water and sanitation sector on behalf of the Federal Government and WaSGISP is being implemented under the DWSSM. So all the water and sanitation activities that will be planned by the DWSSM in the project municipality will be routed through WaSGISP only. Therefore, it is unlikely that, in the next 6 to 10 years, there will be WASH activities in the Surkhet Valley other than the WASH activities supported by the WaSGIP.

Other popular demand of Surkhet Valley include rural and urban roads, small scale irrigation systems, agriculture/horticulture, tourism, urban/market centers, and forest /watershed

conservation. However, as of November 2022, there is no specific and confirmed development plans covering these sectors.

Given the above information, it is clear that:

- (i) WaSGISP is the only confirmed project with assured financing to support WASH activities in the Surkhet Valley for the next 6 to 10 years, and
- (ii) Communities demand for other sectors such as road, community irrigation, urban settlements etc. exist in the Surkhet Valley, but there is no confirmed plan with assured financing.

7.5 Setting of Boundaries

Geographical Boundary

The Surkhet Valley Watershed represents the cumulative impact area of the sub-project. The WaSGISP activities in Birendranagar Municipality will encompass both the urban core and the surrounding rural areas of the municipality. Approximately 40% of the project funds will be allocated to initiatives within the Surkhet Valley. Water and sanitation activities will be implemented not only in the urban areas but also in the adjacent rural areas of Birendranagar Municipality. These efforts will involve the consolidation of small, fragmented water supply schemes under the oversight and coordination of the municipality.

The combined impacts of all these activities on Water Quality and Quantity; and Forest and Ecology of the Surkhet Valley Watershed must be considered in the context of the Bheri Pumping sub-project. This assessment should also take into account existing, planned, and reasonably predictable developments in the future. These cumulative impacts define the scope of the sub-project's influence on the region.

Temporal Boundary

As of May 2023, there are two development projects under construction (132 kV Kohalpur-Surkhet TX line and BBMDP), while WaSGISP is the sole confirmed project with secured financing to support WASH activities in the Surkhet Valley for the next 6 to 10 years. Additionally, despite community demands for other sectors such as road infrastructure, community irrigation, urban settlements, etc., in the Surkhet Valley, no confirmed plans with assured financing are

currently in place (refer 6.2.4 for details). Given the challenge of predicting which community-driven projects will materialize, this RCIA has established the next ten years as the Temporal Boundary. It is expected that only the two ongoing projects and WaSGISP project activities in the Surkhet Valley will be carried out and completed within the Surkhet Valley Watershed. Any cumulative impacts associated with projects stemming from community demands will essentially be incremental to those of the 132 kV TX Line, BBMDP, and WaSGISP.

7.6 Selected E&S Concerns (VECs) Baseline Status

Water Quality and Quantity

According to the study titled "Prioritization of Sub-Watersheds in the Northern Watershed and the Preparation of a Management Plan/DPR for the Critical Sub-Watershed in Birendranagar, Surkhet District, Nepal," Surkhet district is characterized by significant challenges related to land degradation and soil erosion. The area is crisscrossed by numerous rivers, torrents, and water sources, encompassing various scales of watersheds.

Surkhet Valley, where Birendranagar Municipality, the capital of Karnali province, is situated, is particularly susceptible to soil erosion, with frequent natural disasters occurring, especially during the rainy seasons. The population of Birendranagar largely rely on an agrarian economy (See land use map in Chapter 4, Figure 4.2). Over 40 percent of the watershed area in the valley is utilized for croplands. Despite this reliance on agriculture and forests, there is a growing urbanization trend that is altering water use patterns and impacting water sources within the valley. Poor wastewater treatment and encroachment of rivers and wetlands are growing issues endangering the current water sources in the Valley.

With rapid urbanization, Birendranagar is set to expand as an urban area. The urban area has expanded sevenfold between 1989 and 2016, resulting in a 12 percent decline in cultivated land. Both domestic and agro-industrial activities exert high pressure on water demand, leading to environmental degradation due to untreated sewage and agro-toxics. This poses a significant risk to the reliability and quality of water sources, consequently affecting the health and welfare of the population in the watershed.

Notably, the Uttari Jaladhar Kshetra (upper catchment) of Surkhet valley is recognized as a vital region for both water resources and agriculture land, spreading downstream land of Birendranagar

Municipality. Originating from the northern part of Birendranagar within the valley, several small torrents, including Neware, Itram, Khorke, and Ampkholi khola, flow into Nikash khola and finally merge into the Bheri River. These water sources offer both opportunities and threats to the valley's ecosystem.

Forest and Ecology

The Surkhet Valley, situated at an elevation of approximately 700 meters above sea level, boasts abundant forest resources and a diverse range of biodiversity compared to other regions in Nepal. The valley is drained by the Bheri River, a tributary of the Karnali River. The project area falls within the tropical Sal forest and broadleaved forest zone of the western midlands of Nepal. A study by the Department of Forest Research and Survey in 2017 revealed that around 1,746.1 square kilometers of land in Surkhet district are covered by forests, constituting nearly 70% of the district's total land area. Surkhet district is adjacent to Terai regions Banke and Bardia districts, renowned for their lush tropical rainforests and diverse wildlife.

The northern catchment of the Surkhet valley primarily falls within the eco-zone known as the 'Hill Sal Forest Zone,' typically situated between altitudes of 300 to 1000 meters. The Hill Sal forest is not rich in species on dry slopes and flat terraces. However, in moist areas like river gorges and ravines, this forest comprises various tree species, shrubs, and epiphytes. Orchids are particularly abundant in ravine areas. Unfortunately, this forest faces significant disturbances due to human activities owing to its proximity to human settlements.

In the specific areas surrounding the project structures within the river valley floors (ranging from 300 to 500 meters in altitude), the vegetation is representative of lower tropical broadleaved and riverine characteristics. Here, one can find tropical riverine forests, tropical deciduous riverine forests, and riverine Khair-Sissoo forests, which are more prevalent in the western part of Nepal. These forests are dominated by major tree species such as *Sal*, *Tooni*, *Albizzia*, *Terminalia*, *Dalbergia*, *Acacia*, among others. Although a significant portion of this forest has been converted into agricultural land and subjected to extensive human disturbance in the Surkhet Valley, some parts of southern Surkhet along the Bheri river still harbor this type of forest.

7.7 Cumulative Impact Analysis of Selected E&S Concerns (VECS)

Cumulative Impact on Water Quality and Quantity

The combined effects on water quality and quantity arise from the utilization of water resources from the Bheri River source, which are associated with two projects: the Bheri Babai Diversion Multipurpose Project (BBDMP) and the Bheri Pumping Sub-project.

The Bheri Pumping Sub-project will not use a dam across the Bheri River. Low flow of the Bheri River for the 5-Year return period is estimated at 57.6 m³/s and the high flow for the same return period is 3,412 m³/s. The flow measured in December 2020 was 103.5 m³/s. The Bheri Pumping Sub-project will augment the water supply to Birendranagar by pumping 0.56 m³/s of water from the Bheri River. Moreover, the BBDMP currently under construction approximately 12 km upstream to the intake site, will divert 40 m³/s from Bheri River upon completion. After completion of BBDMP, only 17.604 m³/s will be available for the Bheri Pumping Sub-Project.

Even post-completion of BBDMP, a substantial flow of 17.604 m³/s will remain available even during the low flow condition, with only 3.49% of this discharge is being utilized for the Bheri Pumping Sub-Project. For a 100-year return period, the high flow of the Bheri River is calculated at 6201 m³/s, and only 0.009% of this discharge will be extracted for this Bheri Pumping Sub-Project. Withdrawal of this amount of water is unlikely to cause significant reduction in the downstream discharge of the Bheri River.

Cumulative Impact on Forest and Ecology

The Cumulative impact on the forest and ecology results from tree cutting and vegetation clearance associated with two projects: the Kohalpur-Surkhet 132 KV Transmission Line Project and the Bheri Pumping Sub Project.

The ongoing construction of the Kohalpur-Surkhet 132 KV Transmission Line Project necessitates clearing trees along its RoW. Similarly, the Bheri Pumping Sub Project also involves clearing forests for constructing of different infrastructure components, including the transmission line, within four community forests. Both projects have a collective impact on three community forests: Bheri, Shivashakti, and Aishwarya Community Forests.

Specifically, the Kohalpur-Surkhet 132 kV Transmission Line Project necessitates the removal of approximately 2,500 trees from these three community forests. Similarly, the Bheri Pumping Sub

Project requires the cutting of 765 trees and 1021 poles (refer Chapter 4 for details) from the community forests to facilitate its construction activities.

7.8 Impact Significance Determination

Water Quality and Quantity

The Bheri Pumping Sub-project will augment the water supply to Birendranagar by pumping 0.56 m³/s of water from the *Bheri* River, which is 0.97% of the lowest flow of 5-Year return period. For a 100-year return period, the high flow of the Bheri River is calculated at 6201 m³/s, and only 0.009% of this discharge will be extracted for this Bheri Pumping Sub-Project. Even post-completion of BBDMP, a substantial flow of 17.604 m³/s will remain available even during the low flow condition, with only 3.49% of this discharge is being utilized for the Bheri Pumping Sub-Project.

Withdrawal of this amount of water is unlikely to cause significant reduction in the downstream discharge of the Bheri River. Therefore, the cumulative impact on water quality and quantity from reduction of source discharge will be negligible.

Forest and Ecology

The 132 kV transmission line and the Bheri pumping sub-project are primarily designed to avoid any adverse effects on ecologically sensitive areas. Specifically, the Bheri Pumping Sub-project made conscious efforts to minimize its impact on the forest and ecology right from the early stages of project planning. Initially, the project encompassed the Lumbini Province, which includes protected areas like Bardiya and Banke National Parks. However, to prevent adverse impacts on ecologically sensitive zones, the decision was made to exclude the Lumbini Province from the project scope.

Nonetheless, as detailed in the preceding sections, the construction of the 132 kV transmission line and the Bheri pumping sub-project will necessitate the clearing of approximately 3,300 trees and 1,021 poles from the community forests. However, it's important to note that the construction activities will be confined to specific segments within four community forests, constituting merely about 0.3% of the combined forest land (refer to section 6.2 for further details).

Therefore, if these projects are executed without appropriate mitigation measures, there is a likelihood of cumulative impacts on the forest and ecology of Surkhet Valley. This could

particularly manifest as degradation in Bheri, Shivashakti, and Aishwarya Community Forests to some extent, and the significance will be low to moderate.

7.9 Management Strategy

Under Project Control

In the current Environmental and Social Impact Assessment (ESIA) study, the effects on the Bheri Pumping sub-project on Water quantity and quality, and forest and ecology have been recognized, and appropriate mitigation measures have been incorporated into the Environmental and Social Management Plan (ESMP). Within the ESMP, there are recommendations for compensatory reforestation, compensating for forest land, the establishment of nurseries, and designated areas for replantation. These initiatives are being closely coordinated with the Department of Forests (DFO) to ease the environmental consequences resulting from tree clearance associated with these projects (refer Chapter 6 for details).

Under WaSGISP and Birendranagar Municipality (PIU) Control

The WaSGISP includes a distinct Component 3, which focuses on conducting a comprehensive assessment of the watershed and multi-hazard risks in the Northern watershed of Surkhet Valley and the associated upstream catchment areas. The Birendranagar Municipality, who is also the implementing agency of Bheri Pumping Sub-project oversees this component, utilizing an Integrated Water Resources Management (IWRM) approach and water balance modeling. Key objectives include updating baseline hydrological data and evaluating climate change effects on the watershed.

Based on assessment outcomes and identified areas for intervention, this component aims to support low risk, small to medium scale investments to mitigate climate-related risks and enhance water discharge at supply sources within the watershed. The strategies encompass a variety of approaches, including reforestation, watershed preservation, safeguarding water sources, implementing water storage solutions, and utilizing nature-based methods to enhance water quality in both upstream and downstream areas. These measures, when combined with interventions from the Sub-project to address water quality and quantity, will effectively mitigate potential cumulative impacts on both water quality and quantity within the Surkhet valley watershed.

These initiatives align with IWRM principles and relevant land-use policies and regulations. A participatory approach, involving local communities, will prioritize effective and sustainable outcomes, leading to the Greater Surkhet Valley Watershed Management Plan. Reforestation and watershed restoration act as crucial carbon sinks, offering climate change mitigation benefits and aiding in minimizing the cumulative impact of development on Surkhet Valley's forest and ecology.

Management Strategies by other Development Partners

Birendranagar Municipality in coordination with WaSGISP is committed to exerting its utmost efforts to collaborate with government institutions and other developers, promoting the application of best practices to mitigate the cumulative impacts of infrastructure development. Therefore:

- WaSGISP will work closely with the federal, provincial and local government agencies, especially with federal Ministry of Forest and Environment (MoFE), and Ministry of Tourism, Industry, Forest and Environment (MoTIFE), Karnali, as well as their provincial and district offices for the sustainable management of Surkhet valley watershed;
- All infrastructure development initiatives must undergo comprehensive environmental and social assessments, guided by environmental and social risk categorization, regardless of a threshold approach. Special attention should be given to evaluating and mitigating the impact of linear structures such as roads and transmission lines on forests and ecology, following the mitigation hierarchy (avoid, minimize, mitigate, and offset); and
- Infrastructure sharing should be prioritized to prevent unnecessary land acquisition and avoid additional habitat and landscape fragmentation arising from overlapping access roads and transmission lines.

CHAPTER 8

Alternative Analysis

8.1 Introduction

Analysis of the alternatives of the proposed project is an important process of ESIA study that will help to assess the feasibility of the project in regard to technical, environmental & social aspects. Primarily, this involves two alternatives that include "Without Project" or "Do-nothing" Alternative and "With Project" Alternative.

Birendranagar municipality is not only the district headquarters of Surkhet district but also the capital city of Karnali province. The city is experiencing the fastest population growth in the country. People migrate here in large numbers, especially from the hilly and Himalayan districts of Karnali Province. After becoming the provincial capital, the rate of migration of people from other places to search for business, study, and employment opportunities has increased.

According to the report of the census 2021, the population of Birendranagar municipality is 154,886, but it can be assumed that the number of people coming here from outside is much higher than that. The water supplied by the then Jhupra Brihat Water Supply Project (currently Surkhet Valley Water Supply Company) built in 2055 cannot meet the local demand. At present, although the Surkhet Valley Water Corporation is trying its best to quench the thirst of the residents, it is not possible with the existing resources. In the meantime, efforts were made to bring drinking water from the Chinghad river, but the idea was not taken forward as it would have an adverse effect on the farming done downstream of it. At present, people in the municipal area are making alternative arrangements for drinking water by boring on a private level. But due to day by day decrease in underground water storage and increasing population, water supply through boring technology is not possible.

Since there is no possibility of supplying water through the gravity system to overcome this dire water problem, the alternative of lifting water from the Bheri River, which is 9 km from the municipality, has been put forward.

8.2 Without Project or 'do-nothing' Alternative

"Without project" or "do nothing" alternative study of existing water supply system to analyze the existing condition of the project area in the absence of the proposed project.

The water supply system managed by Surkhet Valley Water Users Organization (SVWSUO) is not able to meet the demand of the city inhabitants. Especially in the dry season, the water crisis in this region increases a lot. Although there is a treatment plant in the water supply project, it is not possible to ensure the quality of the water distributed from there. People depend on public and private streams, wells and borings, etc. Although there is no evidence that the drinking water distributed here has affected the lives of the local people, there is a possibility of water-borne diseases in the future due to the continuous consumption of water whose quality cannot be ensured. This causes health risks in the project area which exposes surrounding environmental problems.

In this place, which is currently facing many problems due to water, if concrete and practical initiatives are not taken to solve the water problem, the situation is sure to get worse in the future. Because the current project is not able to meet the demand of the growing population of the municipality. An inadequate water supply forces them to control the use of water for various purposes including sanitation practices. Lack of water in hygiene practices such as flushing water after toilet use, bathing, washing clothes, etc. deteriorates household hygiene in the project area. This can lead to outbreaks of diseases like typhoid, cholera, dysentery and it can cause various environmental problems.

A 'no subproject' or 'do nothing' alternative reinforces the possibility of the aforementioned threats to the environment of the project area. Without the sub-project, people in the project area will continue to consume partially treated or treated water from the existing water supply system. This can increase the risk of bacterial infections that can lead to health problems that can clearly affect public health, animal health and ecosystem health. Similarly, the 'do nothing' alternative forces the local residents to be satisfied with the water service. Established as the capital city of Karnali Province, the lack of a reliable water alternative in this city is also indicative of the underdeveloped state of the province.

This will cause more disruption (a) hinders the further social and economic development of the municipality, (b) the fundamental right to health guaranteed in the Constitution of Nepal (Article 35) states that "every citizen shall have the right of access to water and sanitation" (c) Goal of National Urban Water Supply & Sanitation Sector Policy,2009 (Final Draft) to ensure the socio-economic development, improved health status and quality of life of urban populations, including the poor and marginalized, through the provision of sustainable water supply and sanitation services and protection of the environment and (d) Nepal's delivery of its commitment to SDG 6th to increase the proportion of the population with sustainable access to safe drinking water and basic sanitation.

8.3 With Project Alternative

The Potential benefits of the proposed project were also analyzed along with alternative projects. Analysis has shown that the proposed sub-project is the best option to eliminate the above-mentioned hazards that may arise in the absence of this sub-project. The shortage of drinking water is becoming serious not only in Birendranagar Municipality but also in the entire Surkhet Valley. Therefore, there was no option to search for a reliable and sufficient source to solve the long-term problem of drinking water in this area.

After the successful completion of the Bheri Pumping sub-project, the residents of the project area will get adequate, safe, reliable and potable water supply and sanitation services. Overall, the 'sub-project with alternatives' brings improved public health and living environment which contributes to improving the standard of living of the project municipality.

Therefore, the 'with project' alternative contributes to the implementation of the updated 15-year development plan for the water and sanitation sector of small towns, in compliance with the fundamental right to water and sanitation guaranteed in the Constitution of Nepal (Article 35). Achieving the goals of the National Urban Water and Sanitation Sector Policy, 2009 and delivery of Nepal's commitment to SDG 6.

Along with this, the “without project” alternative is forced to choose the “with project” option due to the limitation of continuous water supply system, treatment system, and susceptibility to waterborne diseases. The proposed sub-project is the best option to overcome the above-mentioned

hazards that may occur in the absence of this sub-project. This "With project" alternative also includes an analysis of alternatives to evaluate the most cost-effective, reliable, and efficient system. Design Population Services.

8.4 Site Alternative

As explained in the above sub-topics, lifting water from the Bheri River is seen as the best option as a reliable source to meet the growing shortage of drinking water in the Birendranagar municipality area. The grounds supporting this option are as follows.

- Bheri river is a constant source of water. Its discharge in the proposed intake area is 57 cubic meters per second in winter months.
- The amount of water required for the sub-project is very insignificant. This will not have any negative impact on the flow of the river and the aquatic life here.
- During the construction of this sub-project, no one's private land will be acquired and not a single family will be displaced.
- Due to this sub-project, there is no need to cut a large number of trees. Only a total of 735 trees need to be cut down.
- Since this sub-project is located near Ratna Highway, it does not need to spend much to access roads.
- The proposed intake area of this project, the area where the water treatment plant will be constructed, the area where the pipeline will be laid and the area where the reservoir will be constructed are not geologically difficult. There is no fear of landslides and floods.
- The area where the intake will be constructed is naturally a strong foundation of stone.

8.5 Access Road

The access road of 900m long need to be constructed to reach the Intake and Water Treatment Plant (WTP) through the concrete bridge that is under construction at Bhangari near the Ratna highway. This bridge is nearly 2.3 km upstream of Bheri and Jhupra Confluence. The objective of this bridge is to connect the village of Lekbesi Municipality with the Ratna highway. In addition, in the Lekbesi Municipality section, an earthen road has been built to reach the Simdamar, Rupse village, and Gangate Bazar of Lekbesi Municipality Ward No 9 through this existing road. This

bridge connects to the existing 5 m wide road, which will constitute a part of access road. At the end of the 5m wide road, there is a 900 m long foot trail that needs to be upgraded to an access road. The existing foot trail is 1m wide. This foot trail is also used by nearby communities of Lekbesi Municipality for the transportation and collection of Non-Timber Forest Products (NTFPs). This access road will follow the transmission line alignment so the number of trees that needed to be fell down will be low.

The project intends to utilize the road as an access road with required upgradation. Upgradation will be done only on the pavement of carriage way. Therefore, it will not require land acquisition and forest clearances. As per the recent update the construction of the bridge has been completed.

8.6 Alternative Sources

The two sites were identified and analyzed after observing various intake site locations during site visits. This section includes a comparison of the two alternatives.

Alternative 1



Figure 8-1: Location of Alternative 1

Alternative 1 lies downstream of the confluence of the Bheri and Jhupra Rivers. The water availability is the same in both alternatives as it lies just downstream of another alternative. This

alternative has limited construction space and bearing capacity for construction seems to be lesser than another alternative as it is founded on Conglomerate geology. This alternative requires river diversion during construction which increases the construction time and cost by a considerable amount. Among other problems, one of the major problems is the quality of water. Due to the flow from the Jhupra River upstream, the quality of water is degraded which includes a large amount of sediment load in a water treatment plant. The consultant has also considered the physiological aspect of the water users and as Ghats was near the intake source.

It is very difficult to build any structure here as the place is more marshy and heavy floods during the rainy season block the flow of the Jhupra.

Alternative 2



Figure 8-2: Location of Alternative 2

Alternative 2 lies on the upstream confluence of Bheri River and Jhupra River, which directly enhances the quality of water to be supplied. In this location, the bearing capacity and structural safety seem to be higher than in alternative 1. The main reason for this alternative to becoming

favorable is that the construction of structures doesn't require the river diversion as the existing rock face can be utilized as a coffer dam which makes this alternative economical.

8.7 Recommended Alternative

Table 21: Recommended Alternative

Parameters	River Intake Alternative 1	River Intake Alternative 2
Water Availability	Yes	Yes
Construction Difficulties/ Space Constraints	Yes	No
Foundation	Fair/Conglomerate	Good/Rock
River diversion during construction required	Yes	No
Accessibility	Good	Good
Structural Safety	Fair	Good
Water Quality	Degrading being immediately located d/s of small Kholsi	Good
Other issues	<p>The ghat (cremation ground) is located nearby, as well as the main road (Ratna Highway) is located very close, so psychological problems may arise for water users.</p> <p>Being close to a ghat (cemetery) and very close to a main road (Ratna Highway) may cause psychological problems for water users. The cremation ground is considered impure in society. There is a scientific basis for this belief of people, as there is likely to be a lot of human movement and cremated remains can mix with drinking water. Similarly, as this place is downstream from the main highway, there is a high chance of water pollution.</p> <p>As per the ESIA field survey the forest area was found dense so the number of trees to be fell down was expected to be higher in Bheri Community Forest.</p>	<p>No</p> <p>No</p> <p>In the ESIA field survey, it was found that proposed site for Intake and RVT in Ranichautari community forest lies in degraded forest, and number of trees to be fell down is low in comparison to alternative 1.</p>

	Also, a gaushala site has been proposed near the Intake side chances of water contamination seems high.	No
Selections	Alternative 2	

Conclusion: According to the research done of both alternatives, Alternative 2 seems favorable in a number of respects. In Alternative 1, the intake side location is located in a fairly stable side near the upstream confluence of the Bheri and Jhupra rivers. A side intake structure will be constructed to extract water from the Bheri River, Also the quality of the water would be good since no others influencing factor were not observed that would deteriorate the quality of water in comparison to Alternative 1. Comparing this position to alternative 1, the bearing capacity and structural safety appear to be suitable and chances of water contamination seems high due to cremation site and gaushala. The key benefit of this approach is number of trees to be fell down is less than alternative 1. Moreover, the building structures doesn't necessitate diverting the river because the existing rock face may be used as a coffer dam, which makes this alternative affordable.

CHAPTER 9

Gender Based Violence/Sexual Exploitation and Abuse (SEA)/Sexual Harassment (SH)

9.1 Gender Based Violence (GBV): National Scenario

Nepal has high incidences of GBV cases with mostly women as victims. 23% of women in Nepal age 15–49 have experienced physical violence since age 15, and 8% have ever experienced sexual violence; 27% of women have experienced physical, sexual, or emotional violence from their current or most recent husband/intimate partner; 53% of women who have ever experienced violence have sustained injuries, Only 28% of women who have ever experienced any type of physical or sexual violence have sought help to stop the violence (DHS, 2022). GBV in Nepal is prevalent due to unequal gender relations and discrimination towards women in both public and private sphere. It has direct implications on the economic, social, reproductive health status of women and physical, emotional, and mental health of their children.

9.2 Legal Framework

Nepal has a robust policy and legal framework for addressing GBV. A strong national mandate devoted to curb and prevent GBV is reflected in the Constitution, in the many Acts of the Nepal country code, and on explicit legislation addressing different aspects of GBV,

- **Constitution of Nepal, 2015:** The constitution of Nepal ensures protection for women from physical, mental, sexual, psychological, or other forms of violence or exploitation based on any grounds. It identifies VAW as a criminal offense and prohibits any form of discrimination based on sex.
- **The National Penal Code, 2017:** The National Penal Code identifies and criminalizes rape, discrimination, sexual harassment at the workplace, and enslavement among others. It prohibits any marriage below twenty years of age in Nepal.
- **The Children Act, 2018:** The Children Act prohibits any discrimination between sons and daughters for nourishment, education, and healthcare.

- **The Human Trafficking (Control) Act 2007:** The Act provides several legal safeguards, including the provision of rehabilitation and integration of survivors, protection, and compensation.
- **The Domestic Violence (Crime and Control) Act 2009:** The Act defines domestic violence as any form of physical, mental, sexual, and economic harm perpetrated by a person to a person with whom he/she has a family relationship.

9.3 GBV/SEA/SH Status in the Project Area and Potential Impact

The project areas include the Badi (Dalits) community on the right bank of the Jhupra River. The proposed pumping station and the treatment plant is around a kilometer on the right bank of the Bheri River located around 500 meters upwards the confluence of the Bheri and Jhupra River. Reservoir area (RVT) in Amrit Danda has surrounding communities mostly consisting of vulnerable communities in specific, Dalits. Long held caste systems and prevalent patriarchy could potentially underpin risks and impacts of GBV and SEA/SH which may arise during construction with labor influx into these vulnerable localized settings. According to the One Stop Crisis Management Center (OCMC) in Surkhet Provincial Hospital, an average of 55 cases per month, related to Gender Based Violence (GBV), come to the center, indicating a high prevalence of GBV ranging from domestic violence, rape, polygamy, sexual harassment in the area – last year alone, the OCMC handled 1014 GBV and SEA/SH related cases. WOREC also confirmed an increase in GBV cases in Birendranagar and surrounding areas, especially during/post pandemic. These already entrenched forms of GBV in communities can be further triggered in the context of project infrastructure work which is expected to mobilize around 150 to 200 laborers per day during peak construction at the water intake and treatment plant area. With no formal structure for grievance hearing, the Social Unit at the Municipality takes on grievances related to gender/SEA/SH and they refer to relevant service providers. Therefore, potential risks of SEA/SH is assessed to be substantial for which a site specific SEA/SH Action Plan along with a code of conduct will be adapted to mitigate the SEA/SH impacts of the sub project. The OCMC is well equipped and functioning with adequate staffs to render services to GBV survivors. It has strong coordination with the municipality and other service providers in the area. Henceforth, once the

project GRM is finalized, a specific procedure for SEA/SH redress, subscribing to the existing work of legit government structure like the OCMC, will be incorporated.

9.4 Purpose of SEA/SH Risk Mitigation Action Plan

The Bheri pumping subproject draws upon the overall project SEA/SH Prevention and Response Action Plan to address and mitigate against any GBV/SEA/SH risk during subproject implementation, and will make any adjustments as required to meet subproject specific SEA/SH risks that were identified during ESIA preparation. The purpose of the action plan is to identify the issues, stakeholders, possible service providers, map existing GBV services and service providers and assess their capacity and document the legal and institutional mechanisms that aid in accessing grievance redressal related to SEA/SH. The subproject will focus on sensitizing the communities and other stakeholders and strengthening institutional capacities. A survivor-centric approach is followed whereby all through the subproject, victim/survivors' care and providing access to different referral mechanisms are considered key aspects of this plan.

Table 22: Sexual Exploitation and Abuse and Sexual Harassment (SEA/SH) Prevention and Response Action Plan

Water Sector Governance and Infrastructure Support Project

Actions to Address SEA/SH Risks	Timing for Action	Responsibilities	Ongoing Risk Management	Remarks/Update Estimated Budget
<p>Trainings and Orientation on GBV/SEA/SH and project activities at three levels</p> <ul style="list-style-type: none"> PIUs and WASH units in municipalities, including social development specialists and social mobilizers PST, MST 	<ul style="list-style-type: none"> Preparation Implementation 	<ul style="list-style-type: none"> WB (initial orientation to the PMU) PMU (GBV focal to conduct orientations to PIU, WASH units, PST)) PIU gender/gbv expert (MST) 	<ul style="list-style-type: none"> WB to monitor and provide additional guidance as necessary 	600,000 (minimum 1 round of trainings per year)
<p>Stakeholder Engagement Plan (SEP) to include SEA/SH risks and options for response during:</p> <ul style="list-style-type: none"> Orientation and consultation with the project affected communities⁹ 	<ul style="list-style-type: none"> Preparation Implementation Operation (throughout the project cycle) 	<ul style="list-style-type: none"> Supervision Consultant 	<ul style="list-style-type: none"> Monitoring of Implementation of Stakeholder Engagement Plan Ongoing consultations particularly when ESMP and C-ESMP is updated 	Part of the SEP budget

<p>Develop Codes of Conduct for project personnel including contractors and workers and project staffs</p> <ul style="list-style-type: none"> • Orientation on CoCs to contractors and workers and relevant project personnel at project sites • Ensure that CoCs are signed by all those with a physical presence at the project site and that requirements in CoCs are clearly understood by those signing. • Disseminate CoCs (in brochure and leaflet forms) and discuss with employees and surrounding communities. • Record keeping of signed CoCs 	<p>Preparation</p> <p>Before mobilization at site</p>	<p>PMU</p> <ul style="list-style-type: none"> • PIUs (Gender/GBV expert -primary responsibility for project personnel) • PST, MST (Facilitation) • Contractors (primary responsibility for contracted workers) 	<ul style="list-style-type: none"> • Amend CoCs as necessary. • Monitoring and reporting of signed CoCs by PIU 	<p>200,000</p>
<p>SEA/SH implementation assigned to Social Specialist in both PST and MST</p>	<p>Implementation</p>	<ul style="list-style-type: none"> • PMU • PIUs • PST, MST 	<ul style="list-style-type: none"> • Specialists with Gender/GBV experience hired to implement the SEA/SH measures 	
<p>Establish a clear mechanism within project GRM to specifically address SEA/SH complaints.</p> <ul style="list-style-type: none"> • Map out GBV services in project area of influence* and E&S risk assessment <p><i>*coordination with the toll-free 24-hour helpline 'Khabar-Garau 1145' and reference to be made from the National GBV service directory¹⁰</i></p>	<p>Preparation/Implementation</p>	<ul style="list-style-type: none"> • PMU/PIUs • GBV focal person within GRM • Gender/GBV specialist • Technical training and overall backstopping by WB 	<ul style="list-style-type: none"> • Ongoing monitoring and reporting of the GRM to verify that it is functioning as intended. Periodic Risk assessment • Update project ESMP and C- 	<p>2,2,00,000</p> <p>Case management</p> <ul style="list-style-type: none"> - Shelter, food, daily kit, clothing - Psychosocial (as needed) (- Legal (as needed)

<ul style="list-style-type: none"> • Develop guidelines/standard operating procedure (SoP) on the process of handling and responding to SEA/SH cases • Identify GBV focal person within the GRM to address SEA/SH complaints incurred by the project • Provide appropriate GBV/SEA/SH response procedural training to the GBV focal person • Conduct community awareness on SEA/SH GRM mechanism including • information on reporting through multiple entry-points • link with OCMC at provincial hospital support services for case management (budgeted) 			<p>ESMP if risk situation changes</p> <ul style="list-style-type: none"> • Update GBV service mapping as appropriate 	<ul style="list-style-type: none"> - OCMC (1.5 L) (yearly) support (trainings, equipment, guidelines) - contingency
Review C-ESMP to verify that appropriate mitigation actions are included.	• Implementation	• PIU	• Review by Task Team	
Conduct community awareness <ul style="list-style-type: none"> • Orientation on GBV/SEA/CSEA • Disseminate provisions on SEA/SH GRM 	• Initiated prior to contractor mobilization and continued during implementation.	<ul style="list-style-type: none"> • PST, MST • Contractor • Gender/GBV specialist 	• Follow up and Ongoing reporting by PST, MST	1 per year 300,000
Orientation and training on GBV/SEA/SH to contractors, subcontractors/petty contractors and their employees	Implementation.	<ul style="list-style-type: none"> • PST, MST • Contractors 	• Ongoing reporting by PST, MST periodic	300,000
Implement safe and gender friendly project-level activities to reduce SEA/SH risks <ul style="list-style-type: none"> • Have separate, safe and easily accessible facilities for women and men working on the site. • Locker rooms and/or latrines should be located in separate areas, well-lit and 	Implementation prior to civil works commencing	<ul style="list-style-type: none"> • Contractors (Primary Responsibility) • PIUs • MST, PST 		500,000

<p>include the ability to be locked from the inside.</p> <ul style="list-style-type: none"> Visibly display signs and CoC around the project site that signal to workers and the community that the project site is an area where GBV is prohibited. 				
Report in the quarterly progress report and review during ISR missions.	Implementation	• PMU, PIUs, Social specialists	Ongoing reporting	
Clearly define the requirement of SEA/SH action plan and CoCs in all the bidding and agreement documents.	Procurement	PIU	Review by PMU, WB	
Clearly itemize incurring costs for SEA/SH activities in procurement documents including contingency fund for undefined or comprehensive activities	Procurement	PIU	Review by PMU, WB	
			Total Budget	4,100.000

CHAPTER 10

Conclusions and Recommendations

This ESIA report provides a comprehensive evaluation of the Bheri Pumping sub-project, examining its social, physical, and biological impacts. While acknowledging some negative environmental effects, the study indicates that the project will yield socio-economic and environmental benefits. Proposed mitigation measures aim to counter adverse impacts, enhancing environmental and social acceptability.

During the construction and operation phases, the project is expected to affect the physical environment, causing disruptions in air, water, and noise quality. Notably, the excavation work (approximately 186,921.00 m³) at the intake and water treatment plant sites poses potential risks, such as air pollution and traffic disturbances. Additionally, pipe laying along Ratna Highway may lead to issues like natural drainage disruption and air pollution.

The biological environment will suffer adverse effects on flora, particularly within four community forests where construction will necessitate clearing approximately 1786 trees. Although the area isn't classified as environmentally sensitive, the loss of trees may impact the forest ecosystem and biodiversity.

Socially, the project will influence the socio-economic environment, affecting the rural population's social structure, cultural practices, and traditional lifestyles due to the introduction of external labor. Concerns about community health and safety may arise, and construction activities may impact religious and cultural sites, like the Shiva Mandir in Amrit Dada. Additionally, the influx of a large labor force in the community forest area may lead to issues related to open defecation during the construction phase.

However, to mitigate the aforementioned identified adverse impacts, suggested mitigation measures have been incorporated in ESMP (refer Chapter 6). Mitigation measures, integral to socially and environmentally responsible construction practices, will be commonly used at construction sites and the Contractors will be aware about it.

In summary, the physical environment of the project site will be fulfilling the increasing water demand of the Birendranagar Municipality regarding the reliable water supply system.

It will definitely address the issues raised by the hardship that people of the municipality are facing for safe, reliable & potable water for years.

The suggested mitigation measures for physical environment are water sprinkle for reducing air pollution, preparation of muck disposal plan & traffic management plan etc. Similarly, the suggested mitigation measures for biological environment are compensatory plantation, through nursery establishment to plant and conserve 17,860 seedlings in the designated land as compensation for the forest land used. The ESIA study has identified Gaushala of Ward no. 11 in Birendranagar Municipality and Bhairab Community Forest for replantation and nursery establishment works. Finally, for the socio-economic environment, the project will create employment opportunities, improve their health and sanitation status, and provide people with additional time for getting engaged in income-generation activities which would otherwise be spent on fetching water prior to this project. Code of conduct for the labors will be prepared, and necessary training/orientation will be conducted as required.

The Rapid Cumulative Impact Assessment (RCIA) of Surkhet Valley watershed has identified water quality, quantity in the Bheri River, and the forest and ecology of the sub-project area as primary environmental and social concerns (VECs). The assessment concludes that the cumulative impact on water quality and quantity is expected to be negligible. However, ongoing and upcoming development projects could potentially result in low to moderate cumulative impacts on the forest and ecology of Surkhet Valley if appropriate mitigation measures are not implemented.

The RCIA recommends a comprehensive management strategy, including project control through the implementation of suggested mitigation actions outlined in ESMP. In addition, municipality control is also advised through the execution of Component 3 of WaSGISP. This component focuses on conducting a thorough assessment of the watershed and multi-hazard risks in the Northern watershed of Surkhet Valley, aiming to develop and implement sustainable outcomes for the Greater Surkhet Valley Watershed Management Plan. Moreover, the RCIA suggests involving other development partners in the management strategies to ensure a collaborative approach.

In conclusion, the ESIA study results indicate that the potential E&S risks of the Bheri Pumping sub-project can be managed through implementation of recommended ESMP actions. The ESMP outlines the necessary mitigation measures along with their associated

costs. The total estimated cost for implementing the **Environmental and Social Management Plan, including the cost of mitigation, is NRs. 190,451,919.19 (USD 1.46 million, rounded figure).**

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LIST OF ANNEXES

Annex 1: General Layout Map of Project Area



Annex 2: Category of Sub-project

Categorization of subproject activity is essential for early understanding of the type, nature and scale of any impacts. The results of the screening form the basis for assigning the environmental and social risk category of activities and inform decisions on the extent and depth of environmental and social due diligence that will be undertaken. The process of screening identifies the key aspects that may need to be further examined and managed. Activity categorization is essential for early understanding of the type, nature and scale of any impacts.

Category I ineligible sub-project (activities) are for interventions that will not be supported by the Project.

Category II sub-projects are those with significant adverse environmental and/or social impacts that are limited to actual site of the activity and its immediate surroundings, and which can be addressed through readily known or readily available mitigation measures. Those activities that are eligible for project support may require an Initial Environmental Examination (IEE) or Environmental Impact Assessment (EIA) as per the government regulations. To meet ESS requirements, Category II activities will require preparation of ESIA. If E&S screening indicates physical displacement, preparation of RAPs will also be required. IP issues identified during the screening will be addressed through support measures suggested in the site level IPPs. Other plans may also be required, as determined by E&S Screening e.g., Biodiversity Management Plans. Additionally, Stakeholder engagement activities will be required in all cases. The safeguard documents for such activities will be reviewed by the PMU and will be submitted to the World Bank for review, no-objection and/or clearance. E&S risk as well as level of assessments required will be agreed with the World Bank.

Category III sub-projects are those for which there is a ‘moderate risk of impact’ which requires preparation of ESMPs to meet ESS requirements. A Brief Environmental Study (BES) may be required to meet the government regulations. An activity is classed as Category III if its potential adverse environmental or social impacts on human and/or on the environment are less adverse than those of Category II activities. Impacts will be limited to

a specific site, will be reversible and mitigation measures will be known or can easily be designed.

Category IV sub-projects are those that have minimal or no adverse environmental and/or social impacts. For these activities, further environmental and social assessment beyond initial screening is not required. The screening report for a Category IV activity will recommend mitigations measures for the minor issues/impacts identified. This may be in the form of a good practice code for activity implementation (to be developed by PMU/Municipalities).

Where the ESIA identifies potential risks and impacts on biodiversity or habitats, the project will mitigate those risks by following the mitigation hierarchy and good practices in the preparation of site-specific ESMPs. But where significant risks to and adverse impacts on biodiversity have been identified, a separate Biodiversity Management Plan may be prepared and implemented for the sub-project.

Subproject Category and Relevant Documents

Environmental and Social Assessments and Plans for different Categories of Activities

Category of Sub-Project	Is E&S and Social Impact Assessment Required? (beyond initial screening) <i>WB Requirement</i>	Is E&S Impact Assessment Required? (beyond initial screening) <i>National Requirement</i>	ESMP required?	Comments
Category I	Not supported	Not supported	Not supported	Not supported
Category II	Yes ESIA	Yes, either IEE or EIA	Yes	May also require an IPP, RAP, ESMPs or other type of specialized management plan (depending

				on likely impacts).
Category III	ESMP	Brief Environmental Study may be required in some cases	Yes	May also require a RAP, ESMPs and/or other Plans (depending on likely impacts).
Category IV	No	No	No	Use code of practice to mitigate adverse impacts during implementation.

Annex 3: Checklist for Collection of Physical, Biological & Socio-Economic Information

A. Physical Environment

Parameter	Description
Topography	
Geology (Rock and Soil Types)	
Erosion and Sedimentation	
Construction Sites	
Sites for Labor Camp	
Site for Storage and Stockpiling	
Accessibility	
Land Use	
Air Quality	
Water Quality	
Noise Level	

B. Vegetation and Wildlife

Vegetation in the Project Area

S. N.	Local Name	Botanical Name	Location	Vegetation Type	Local Status	Local Use	Protection Status		
							GoN	IUCN	CITES

Mammals in the Project Area

S.N.	Common Name	Scientific Name	Habitat	Local Status	Crop/Livestock Raider	Local Use	Protection Status		
							GoN	IUCN	CITES

Birds Sighted in the Project Area

S.N.	Common Name	Scientific Name	Type	Habitat	Local Status	Protection Status		
						IUCN	CITES	GoN

Herpeto-fauna in the Project Area

S.N.	Local Name	Scientific Name	Habitat	Local Status	Status Code			Local Use
					CITES	IUCN	GoN	

Fish in the Project Area

S.N.	Local Name	Scientific Name	Status of Occurrence	Migratory Status/Season	Observed Location

C. Socio-Economic and Cultural Environment

Parameter	Description
Demography a) Population (Male, Female) b) Caste Ethnicity c) Language d) Religion and Culture e) Literacy	
Occupation	
Income and Expenditure	
Migration Patten	
Public Health and Sanitation	
Drinking Water Supply	
Education Facilities	
Communication	
Fuel and Energy	
Road and Transportation	
Land Holding	
Agricultural Practice	
Food Sufficiency	
Irrigation	
Health Care System	
Market	
Business and Industries	

Religious and Cultural Sites	
Non-governmental activities	
Water Use Right (irrigation, drinking, water mills, micro hydro, other existing and planned structures)	
Detail of Project Affected Family and Structures	

Annex 4: Details of Stakeholder Consultations

S.N.	Venue and Date	Participation	Major Concern raised	Response	Responsible Agency
1	FEDO Office, Ganesh Chok, Birendranagar 25 May , 2023	Dalit Women's Association, Marginalized Women's Association, Dalit Service Association, media workers, INCEC, Ekal Mahila Uttha Sangh	<ul style="list-style-type: none"> • Discrimination at Public Taps: Measures must be taken to eradicate discrimination against Dalits and marginalized individuals when accessing public water taps. Strict actions should be in place to prevent any mistreatment or violence. • Employment Opportunities: Efforts should be made to create an inclusive environment where educated Dalit youth can find employment according to their qualifications within the project. This will help break the stereotype that Dalits are only unskilled workers. • Private Connections: Considering the discrimination faced by Dalits at public taps, providing private water connections in every household can help ensure equal access and avoid further humiliation. 	<ul style="list-style-type: none"> • This project will treat all users equally. The project is conscious of providing reliable and safe drinking water to every users. In the construction and operation of the project, local people will be given a role according to their capacity. • The project will provide drinking water to every house through private connection. 	PIU, Contractor, Municipality
2	Birendranagar Municipality, Meeting Hall 25 May , 2023	Elected representatives including Mayor and Deputy Mayor of Surkhet Municipality, members of the municipality's executive committee, officials of Birendranagar municipality, representatives of drinking water user committee and representatives of	<ul style="list-style-type: none"> • Disaster Reduction and Management: Implementing fire control points to address fire incidents and ensuring preventive measures to avoid water leaks and potential destruction during post-construction testing are essential for disaster reduction and management. • Integrated Development: Adopting a one-door development system for water, road, and electricity works will help eliminate duplication of efforts and streamline infrastructure development in the project area. • Project Transparency: Regular updates and public information about the project's progress 	<ul style="list-style-type: none"> • Disaster Reduction and Management is the responsibility of the project. • The project will pay attention to avoid duplication of work in coordination with all agencies. • Since the goal of this project is to promote good governance, transparency 	PIU, Contractor, Municipality

		various organizations working in Surkhet district.	should be provided to maintain transparency and good governance. Alternative measures, such as boreholes in the upper area of Surkhet valley, should be considered to address immediate drinking water problems.	will be maintained in all activities of the project.	
3	Amrit Dada (near the reservoir construction site) 26 May , 2023	Local residents, Surkhet Valley Water Supply Company No. 4 scheme center and officials of Aishwarya Community Forest Users Committee	<ul style="list-style-type: none"> • Displacement and land encroachment: Strict rules and regulations should be established to prevent incidents of landless people being displaced or powerful people manipulating project maps as happened in other projects in the past. Contractor should be held accountable and prevented from taking advantage of vulnerable communities. • Labor Camps and Workers' Rights: Disputes between workers and local communities should be minimized by maintaining discipline within labor camps. Ensuring minimum standards for workers, equal wages for equal work, timely payment, and workers' insurance are essential steps to protect their rights and maintain harmonious relationships. • Support in physical infrastructure for tourism promotion: Maintain the beauty of this area by constructing a water park around the reservoir site. • Employment of Local People: Priority should be given to employing local residents, especially those who are unemployed, in the project. Furthermore, promoting the employment of women will contribute to gender equality and empowerment. 	<ul style="list-style-type: none"> • Contractors and builders will follow the DPR completely. This work will be continuously monitored. • Sufficient attention will be given to minimize the social effects that may be caused by labor influx. Care will be taken to create a code of conduct for them and follow it. • The project is sensitive to meet the demands of users as much as possible. 	PIU, Contractor, Municipality
4	Shivaskhti Community Forest Area* 26 May, 2023	Users of of Shivashakti Community Forest	<ul style="list-style-type: none"> • Expenditure and financial assistance: Due to the 132 KV transmission line under construction by the Nepal Electricity Authority, the cost of stockpiling for cutting trees is not available to the forest users, so their 	<ul style="list-style-type: none"> • This project will work in effective coordination with the Division Forest Office. Efforts will be made to provide the 	PIU, Contractor, Municipality

5	Bheri Community Forest Area 26 May, 2023	User of Bheri Community Forest	<p>private money is being spent. Therefore, it is necessary to ensure that community forest users are provided with financial support during tree counting and stocking in future plans.</p> <ul style="list-style-type: none"> • Support to Infrastructure Development: Focusing on cleanliness and hygiene in the Both Community Forest area will promote tourism and improve the living conditions of the local community. Protection of springs and the construction of recharge ponds should also be prioritized. 	<p>amount proposed in the ESMP to the users of the concerned community forests.</p> <ul style="list-style-type: none"> • Sensitive to meet the demands of users as much as possible. 	
6	Office Ranichautari Community Forest-Users Committee, Lakebesi-10 27 May, 2023	Officials, members and users of Ranichautari Community Forest Users Committee	<ul style="list-style-type: none"> • Although the users of Ranichautari community forest are not the users of the Bheri Pumping Project, as they allow their forest area to be used by the project, the project should focus on their development. • Transparency of prior decisions: The new working committee should be made aware of the previous decisions made on this matter in order to ensure continuity and an educated decision-making process. 	<ul style="list-style-type: none"> • Efforts will be made to address the demand in coordination with Birendranagar Municipality 	PIU, Contractor, Municipality
7	Birendragagar, Ittram 27 May, 2023	Surkhet Valley Water Supply Association Scheme No 1 and 3	<ul style="list-style-type: none"> • Project Sustainability: Utilizing the experience of current water supply employees, creating alternative arrangements for the project's completion, and implementing inclusive tariff rates will contribute to the sustainability of the project. • Water Quality and Accessibility: Safe and clean drinking water is crucial. Awareness programs should be conducted to educate Dalits and marginalized communities about water safety. Additionally, ensuring a water supply from the river and implementing a fair and inclusive tariff system will help address affordability concerns. 	<ul style="list-style-type: none"> • This project will pay attention from the beginning for the sustainability of the project. • The drinking water distributed by the project will be of good quality. • A grievance redressal mechanism has been established to address the grievances received in the project 	PIU, Contractor, Municipality

			<ul style="list-style-type: none"> Grievance Redressal: Establishing a system that is easily accessible and understandable for filing complaints is crucial for marginalized and disadvantaged communities. Simplified procedures and a dedicated body to handle grievances will help ensure that complaints are heard and addressed promptly. 		
8	<p>Surkhet Valley Water Supply Organization 27 May, 2023 (Focus Group Discussion: FGD) 28 May, 2023</p>	<p>Engineer Mr. Balaram Tiwari of SVWSO, Ms. Gita Sunar, Vice Chairperson of Shiva Shakti Community Forest, Mr. Gaja Bahadur Budha, Chairperson, Ward No 2 of Birendranagar Municipality, Mr. Top Lal Chapai, Senior Forest Guard (Non-Gazetted Fifth 5th Level) of Division Forest Office Surkhet, Ms. Birma BK (Cunara), Chairperson of Aishwarya Community Forest and Ms. Malati BK, Treasurer of Dalit Sewa Sangh, Surkhet</p>	<p>Q. What potential impacts do you anticipate the proposed Bheri Pumping sub-project could have on the lives of the residents of Birendranagar?</p> <ul style="list-style-type: none"> Inadequate water supply facilities are a pressing concern for Birendranagar, the capital of Karnali province, especially during periods of drought. This sub-project holds significant importance as a lasting remedy to address the water needs of the community. Project offers income-generating work like kitchen gardens, benefiting locals by increasing knowledge and skills during construction. Access to safe drinking water has a positive impact on women's daily lives, as they perform social duties such as preparing food, bathing children and cleaning homes. <p>Q. Which community is suffering the most water shortage in this place so far?</p> <ul style="list-style-type: none"> Dalits face limited access to water, often forced to live in informal settlements with insufficient supplies and long lines during the dry season. Due to lack of drinking water and decreasing ground water level, people are forced to bathe in bubbling lakes and distant streams. In the current situation, there is more shortage of water in the places under Ratna Highway. Besides, there is a great shortage of water in the periphery of the valley. 		PIU, Contractor, Municipality

			<p>Q. What is the prevalence of waterborne diseases in Birendranagar? What measures have been taken to address this issue?</p> <ul style="list-style-type: none"> • Particularly in the rainy season, there is a noticeable increase in the occurrence of waterborne ailments. Among these, this issue is more widespread in regions inhabited by Dalit communities due to their lack of awareness regarding the necessity of boiling water. Even those who are conscious of this fact are unable to bear the cost of boiling water. • Some organizations distribute water filters in few poor communities. But due to lack of proper operation and cleanliness, the function of the filter has not been effective. Not everyone has received the filter distributed in this way and they do not have the financial capacity to buy such a filter. Therefore, future construction projects should provide completely safe drinking water. • In various cases, water becomes contaminated when stored at home. As water is available once in seven days, individuals are compelled to store quantities exceeding their immediate requirements. When storing water in this way, it is not possible to properly cover it. Therefore, the water supply projects that will be built in the future must provide sufficient and completely safe drinking water. <p>Q. What should be done for the sustainability of this project?</p> <ul style="list-style-type: none"> • Complex technology may increase project costs, but people pay tariffs for reliable, safe drinking water. Regular quality water supply and maintenance from a reliable source will raise tariffs, and municipal resources can be utilized for major maintenance. 		
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			<ul style="list-style-type: none"> • The project involves lifting large volumes of water, requiring specialized knowledge in connection, operation, and maintenance. Contractors will handle this work after construction, but users must be qualified to operate and maintain the project. Municipality should focus on increasing user capacity from now on. <p>Q. Is there any possibility of negative impact from this water project?</p> <ul style="list-style-type: none"> • Outside workers may abuse community women, posing conflict; builder and community must prevent workers from leaving their camp and abusing women. • Our community forest may be damaged due to the project. Therefore, arrangements should be made to cut down as few trees as possible. If the trees are cut down randomly, the negative impact of this project will start to be seen. • The Division Forest Office was involved in the Environmental Impact Assessment research of the project. The research team has already calculated how many trees need to be cut. Although the amount seems excessive, in practice there is no need to cut down so many trees. Because, according to the Forestry Act, trees that are not counted in the research cannot be cut later. However, it is better if the enumerated trees are not cut down. Thus, after the completion of the project, less trees will be cut than the current estimate. • Yes. If a tree falls while digging a trench to lay a water pipe, the path of the trench can be slightly changed to protect it. Although the size of the pipe is large, it can be turned right or left up to up to 11 degrees from the joints, so trees 		
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			<p>can be protected. But there should be good monitoring of this matter.</p> <p>Q. What will be the social and cultural impact after the completion of this project?</p> <ul style="list-style-type: none"> • Project benefits health, reduces stress, and provides safe water for people. • Eliminate social prejudice by ensuring equal access to water, as safe water reduces illness rates. • The project will provide employment to the local people as well as provide them with new skills. Similarly, water related conflicts will be reduced as every house will be ensured water supply through this project. • We are confident that through this project, people will develop a feeling that the state is the guardian of the citizens. 		
9	<p>Key Informant Interviews (Key informant interviews are a qualitative research method involving individuals with specific knowledge or expertise to gather in-depth information on a topic. This report summarizes key informant interviews with stakeholders conducted on</p>		<ul style="list-style-type: none"> • Historically, Dalits have been subjected to prejudice when accessing drinking water from public water taps. The focus of this initiative is to introduce individual water taps, a positive step. However, the existing approach mandates land ownership for a private water connection, which poses a challenge for many landless Dalits in the area. It is important for the local authorities to address this issue and consider revising the relevant regulations. • Water purification is very important. Even though people are trained on drinking water safety plan, the probability of water pollution remains high due to lack of awareness among them. Therefore, this project should provide 100% safe water. • The difficulties encountered by marginalized women are formidable. Consequently, establishing a connection for water supply and meeting regular financial obligations becomes 		<p>PIU, Contractor, Municipality</p>

	May 25-27, 2023.)		<p>difficult for them. Given their specific situation, it is incumbent upon the government to furnish them with complimentary drinking water up to a designated usage threshold. Furthermore, during the implementation of projects, disadvantaged women should be offered employment opportunities in accordance with their qualifications.</p> <ul style="list-style-type: none"> • The project should provide water tariff concession to single female headed households considering their poor income. • During the construction phase, when the construction materials are transported by heavy vehicles to this place, the Amritdada settlement may be exposed to noise pollution and air pollution. Therefore, pollution prevention measures should be considered at the outset. • The condition of our forest is worsening with each passing day due to various developmental endeavors such as the construction of roads, electricity infrastructure, and water supply within the forest's vicinity. While we endorse these progress initiatives as conscientious members of our nation, it remains crucial for us to minimize the negative impact on our forest's vitality. Consequently, we urge for the primary conduit of the Bheri Pumping Project to be laid through our community forest region, utilizing the established corridor of the 132 KV transmission line. By doing so, we aim to preserve the integrity of the forested area. • The Bheri Community Forest area serves as the gateway to the Karnali province's capital, influencing newcomers' first impressions. However, the area's negative image is due to widespread open defecation and unregulated dumping, particularly for public transport 		
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			passengers. To rectify this, installing public toilets across the area and placing them under the supervision of the Community Forest Users Committee is crucial for addressing these issues.		
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Annex 5: Water Quality Analysis Report of Bheri River



Tel: +977-083-523248
E-mail: wqtda@gmail.com

Government of Nepal
Ministry of Water Supply
Department of Water Supply and Sewerage Management
Federal Water Supply and Sewerage Management Project
Water Quality Testing Laboratory
Birendranagar, Surkhet

WATER QUALITY TEST REPORT

Name of Client: - Bheri lift sub project kha.pa.nayojana

Sampled By: -Client

Source of Sample: - Bheri River Water

Sampling Point: - Direct Bheri River

Location: - Bheriganga -10, Surkhet

GPS:-

Date of Collection: - 2079/3/2

Date of Analysis: - 2079/3/2

Date of Completion: - 2079/3/3

S.No.	Category	Parameters	Observed Values	NDWQS, 2062 BS	Methods Used
1	Physical	Turbidity (NTU)	170	5 (10)	2130 B, APHA, 21 st EDITION
2		Temp. °c	26.3	-	2550 B, APHA, 21 st EDITION
3		pH	6.93	6.5 - 8.5 *	4500-H ⁺ B, APHA, 21 st EDITION
4		Electrical Conductivity (µs/cm)	54	1500	2510 B, APHA, 21 st EDITION
5	Chemical	Iron (mg/L)	0.15	0.3 (3)	3111 B, APHA, 21 st EDITION
7		Arsenic (mg/L)	<0.05	0.05	3114 C, APHA, 21 st EDITION
12		Ammonia (mg/L)	0.06	1.5	4500-NH ₃ C, APHA, 17 th EDITION
15		Total Hardness (mg/L as CaCO ₃)	34	500	2340 C, APHA, 21 st EDITION
16		Calcium (mg/L)	12	200	3500-Ca B, APHA, 21 st EDITION
18		Residual Chlorine (mg/L)	-	0.1-0.2*	COLORIMETRY
19	Microbiological	Faecal coliform (<i>E.coli</i>)(CFU/100 ml)	0	0	9222 D, APHA, 21 st EDITION

APHA: American Public Health Association, Standard Methods for Examination of Water & Waste Water

* These values show lower and upper limits.

() Values in parentheses refer the acceptable values only when alternative is not available.

Note: - The entire test was conducted as per the National Drinking Water Quality Standard Guide Line, 2062BS

[Signature]
Analyzed By
Assistant Chemist

[Signature]
Approved By
Assistant Chemist

Annex 6: Field Photographs



Proposed intake site on the bank of
Bheri river



Proposed Water Treatment Plant site in RaniChautari
Community Forest



Access road to WTP Site



Pipeline alignment in Shiva Shakti Community forest
area




Quadrat being placed at the proposed reservoir
construction site in Amritdada



Tree count marking in Rani ChauTari Community
Forest

Annex 7: Consent Letters of Community Forest Users Groups

Consent letter obtained from Bheri Community Forest User Group

 **श्री भेरी सामुदायिक वन उपभोक्ता समूह**
वीरनन्दनगर-८, १२, सुबंत
मिति २०८०१५

संख्या: ०७५१०८०
दि नं.: १६९

विषय: सहमति दिले वारे

श्री ~~तामसिप प्रमुख~~
एकानेकानी तथा वन एकास्थापन विभाग,
जानी पोखरी, गढगाडी

उपरोक्त शासनाच्या भेरी सामुदायिक वन उपभोक्ता समूहाचे वन क्षेत्रावर वारंवार भेरी पम्पाड उपआयोजनाद्वारा निर्माण झालेले नैसर्गिक संपत्ती निर्माण करणे व नुकते कुरा जाणकारी गाराडे या सहमति पत्र दिले. वगैरे जाणकारी गाराडे यांच्या (आयोजना) शासनाच्या समूहाच्या माग मर्यादा शासनाच्या योजने निर्माण गाराडे हे वन अनुरोध हे

श्री वहापुरी लेंद
(अध्यक्ष)
अध्यक्ष



श्री शिवशक्ति सामुदायिक वन उपभोक्ता समूह

वीरेवदनगर-१० र ११, सुरसेत

पत्र-संख्या:- ०६९/०८०


चलानी नम्बर:- २१

मिति: २०/०२/०८

विषय:- सहकारि दिहमेका बारे

श्री कार्थिक प्रमुख
राने पानी तथा वन उपवस्थापना
विभाग पानी पोषी कठमाडौं।

उपरोक्त सानन्वया विभागे पत्र सं ०६९/०८०-च.नं
-८१ मिति-२०/०२/०८ को प्राप्त पत्र अनुसार मैरी-
पम्पिङ्ग उप आयोजना निर्माणका लागि प्राप्तवीड कालाकर
परिक्षण (I.E.E) को मस्यौदा ल्याए मैसुडे र यस
शिवशक्ति सामुदायिक वनमा पूर्वाधार निर्माणका लागि
आवश्यक सहकारि सहजीउरठ/गर्न सामुदायिक वन
सकिली तयार रहेको जानकारी साथै पूर्वाधार निर्माण
का लागि सहकार पत्र दिहमेका छयदोरा जानकारी हे।

 मनकुमारी आचार्य
अध्यक्ष



ऐश्वर्य महिला सामुदायिक वन उपभोक्ता समूह

वीरेन्द्रनगर, सुब्बाकुना, सुर्खेत

पत्र-संख्या:- ०६९१०२४
चलानी नम्बर:-



मिति:- २०२०/२११६

विषय:- सदस्यता पत्र व्यवस्थापन समिति को व्यवस्थापन

श्री स्वामिपति क्षेत्रात् सुमान तथा दुर्वावा सहयोग
कार्योजना


स्वामिपति तथा वन व्यवस्थापन विभाग
पति घोषणा कार्य

उपरोक्त समूहका सुर्खेत जिल्लाको सदरमुकाम
विटेडू गा.पा. निगार्ड हुन गा.का अर्दी पार्सि उप
कार्योजना का लागि यस मापुविद्युत री शंजु मेम निगार्ड
जागेत विगिणेल गा.वि.उ. पार्सिपारुडन निगार्ड गत अ
सदस्यता पत्र प्रदान गरीएको हो

सुब्बाकुना

विभागीय
विभागीय सुब्बाकुना
मिति: २०२०/११
सुब्बाकुना

A letter written by the mayor of Birendranagar Municipality to Lakebesi Municipality to coordinate with Ranichautari Community Forest User Committee to grant approval for the construction of Bheri Pumping Sub-Project



वीरेन्द्रनगर नगरपालिका

नगर कार्यपालिकाको कार्यालय

०८३-५२०२६३
०८३-५२०१४४
०८३-५२०१२८


पत्र संख्या:- २०७९/८०
चलानी नम्बर:- ५९०५

वीरेन्द्रनगर, सुर्खेत
कर्णाली प्रदेश, नेपाल
(.....प्रशासन.....शाखा)

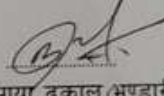
मिति:- २०८०/०२/२१

विषय : आवश्यक समन्वय गरिदिने सम्बन्धमा ।

श्री नगर प्रमुख ज्यू
लेकवेशी नगरपालिका, सुर्खेत ।




उपरोक्त सम्बन्धमा नेपाल सरकार, खानेपानी क्षेत्रगत सुशासन तथा पूर्वाधार सहयोग आयोजना, अन्तर्गत वीरेन्द्रनगर नगरपालिकामा भेरी पम्पिङ उप आयोजना निर्माण हुन लागेकोमा हाल उक्त उप आयोजनाको प्रारम्भिक वातावरणीय परीक्षण (IEE) को मस्यौदा तयार भइसकेको सन्दर्भमा उक्त उप आयोजनाका विभिन्न पूर्वाधारहरू तैहा नगरपालिका अन्तर्गत श्री रानीचौतारी सामुदायिक वन उपभोक्ता समिति, लेकवेशी नगरपालिका-१० को क्षेत्रभित्र समेत पर्ने भएकोले उक्त क्षेत्रमा पूर्वाधार निर्माण गर्नको लागि सम्बन्धित वन उपभोक्ता समितिबाट सहमतिपत्रको लागि आवश्यक समन्वय गरिदिनुहुन अनुरोध छ ।


मोहनमाया ढकाल (भण्डारी)
नगर प्रमुख
लेकवेशी नगरपालिका (भण्डारी)
नगर प्रमुख

Website : birendranagarmun.gov.np

Email : ito.birendranagarmun@gmail.com

A letter written by the Chief Administrative Officer of Birendranagar Municipality to Ranichautari Community Forest User Committee to give permission for the construction of Bheri Pumping sub-project structure within the forest area.


**वीरेन्द्रनगर नगरपालिका**
नगर कार्यपालिकाको कार्यालय

०८३-५२०२६३
०८३-५२०१४४
०८३-५२०१२८

पत्र संख्या:- २०७९/८०
चलानी नम्बर:- २९०६

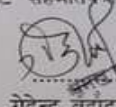
वीरेन्द्रनगर, सुर्खेत
कर्णाली प्रदेश, नेपाल
प्रशासन.....शाखा)

मिति:- २०८०/०२/२१


विषय : सहमतिपत्र उपलब्ध गराइदिने सम्बन्धमा ।

श्री रानीचौतारी सामुदायिक वन उपभोक्ता समिति
लेकबेशी नगरपालिका- १०, सुर्खेत

उपरोक्त सम्बन्धमा नेपाल सरकार, खानेपानी क्षेत्रगत सुशासन तथा पूर्वाधार सहयोग आयोजना, अन्तर्गत वीरेन्द्रनगर नगरपालिकामा भेरी पम्पिङ उप आयोजना निर्माण हुन लागेको यहाँलाई अवगत नै छ । हाल उक्त उप आयोजनाको प्रारम्भिक वातावरणीय परीक्षण (IEE) को मस्यौदा तयार भइसकेको सन्दर्भमा उप आयोजनाका विभिन्न पूर्वाधारहरू निर्माण गर्न सामुदायिक वन उपभोक्ता समितिको सहमतिपत्र आवश्यक पर्ने भएकाले तहाँ समितिबाट सहमतिपत्र उपलब्ध गराइदिनु हुन अनुरोध छ ।


गेहेन्द्र बहादुर डाँगी
प्रमुख प्रशासकीय अधिकृत

Website : birendranagarmun.gov.np Email : ito.birendranagarmun@gmail.com



श्री रानीचौतारी सामुदायिक वन उपभोक्ता समूह

साटाखानी-४, सुर्खेत

पत्र संख्या : ०६९/८०

बसानी नं. : १४



मिति : २०८०/०३/२४ गते

विषयः शहमती पत्र उपलब्ध गराईको सम्बन्धमा

श्री श्वानेपति होमबाट सुरक्षागत तथा पुर्वदिशर सहयोग आयोजना
श्वानेपति तथा दल व्यवस्थापन वि.भाग
पानिचौरवरी, काठमाडौं

उपरोक्त सम्बन्धमा सुर्खेत जिल्लाको खड्कपुरकाम विद्युत् लाइन
मा निर्माण हुन लागेको वारी पपिड्डा उप-आयोजनाको
लागि पत्र रानीचौतारी खा.ब.उ.स.को क्षेत्र फिर्ता निर्माण
गरिने विधिवत मौखिक पुर्वदिशर निर्माण गर्ने यो
शहमती पत्र प्रदान गरिएको छ। उक्त निर्माणकार्य
गर्दा स्थानीय मापदण्डको पालना गरी अनुदानको वन-
भू-पैदावार र वन्यजन्तु समूह घशु-घसिनेहरूको घवाइर
संरक्षण र सम्बर्धन गरेर काम गर्न पनि अनुरोध गर्दछौं।

श्रीमान १९९१
२०८०/२/२४

अध्यक्ष
अध्यक्ष

रानीचौतारी सामुदायिक वन उपभोक्ता
समूह लेकवारी त.पा.१० सुर्खेत

A copy of the minute demanded by the Ranichautari Community Forest User Committee for the development of their area within their forest area.

Date _____
Page _____

आज मिति २०८०/०२/२४ गतेका दिन यस शनिचौतारी सामुदायिक वन उपभोक्ता समितिका अध्यक्ष श्री श्रीमन्महादुर खड्का गुरुको अध्यक्षतामा बैठक बसी निम्न लिखित प्रस्तावहरूमाथि छलफल गरी सर्व-सहमत निर्णय पारित गरियो।

उपस्थित

श्रीमन्महादुर (अ) अध्यक्ष श्री - श्रीमन्महादुर खड्का
 श्रीमन्महादुर (ब) अध्यक्ष श्री - सविता मैथी
 श्रीमन्महादुर (ग) अध्यक्ष श्री - जण्डा बस्नेत
 श्रीमन्महादुर (घ) अध्यक्ष श्री - कशिला थापा
 श्रीमन्महादुर (ङ) अध्यक्ष श्री - मान बहादुर विक
 श्रीमन्महादुर (च) अध्यक्ष श्री - देविशरा कार्की
 श्रीमन्महादुर (छ) अध्यक्ष श्री - बुशन्ता शर्मा
 श्रीमन्महादुर (ज) अध्यक्ष श्री - तेज बहादुर तामाङ
 श्रीमन्महादुर (झ) अध्यक्ष श्री - रेखा शर्मा
 श्रीमन्महादुर (ञ) अध्यक्ष श्री - सुनसिंह सुनार
 श्रीमन्महादुर (ट) अध्यक्ष श्री - टंक प्रताप पाय्रोल

आमन्त्रित

श्रीमन्महादुर (क) अध्यक्ष श्री - लेकवेही लम्बा कडा नं. १० का अध्यक्ष - श्री परशुराम पन्डारी
 श्रीमन्महादुर (ख) अध्यक्ष श्री - चन्द्रप्रताप मा. वि. वि. वि. अध्यक्ष - श्री मान बहादुर खड्का
 श्रीमन्महादुर (ग) अध्यक्ष श्री - श्रीमन्महादुर खड्का
 श्रीमन्महादुर (घ) अध्यक्ष श्री - श्रीमन्महादुर खड्का
 श्रीमन्महादुर (ङ) अध्यक्ष श्री - श्रीमन्महादुर खड्का
 श्रीमन्महादुर (च) अध्यक्ष श्री - श्रीमन्महादुर खड्का
 श्रीमन्महादुर (छ) अध्यक्ष श्री - श्रीमन्महादुर खड्का
 श्रीमन्महादुर (ज) अध्यक्ष श्री - श्रीमन्महादुर खड्का
 श्रीमन्महादुर (झ) अध्यक्ष श्री - श्रीमन्महादुर खड्का
 श्रीमन्महादुर (ञ) अध्यक्ष श्री - श्रीमन्महादुर खड्का
 श्रीमन्महादुर (ट) अध्यक्ष श्री - श्रीमन्महादुर खड्का

प्रस्तावहरू

१) शनिचौतारी सामुदायिक वन उपभोक्ता समितिको प्रयासबाट
 २) श्रीमन्महादुर खड्का उप-आयोजना लई सहमति दिने सम्बन्धमा।

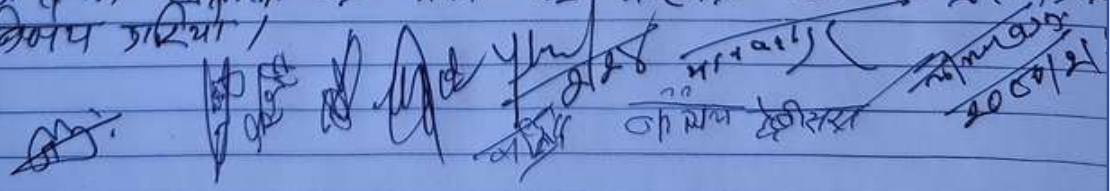
निर्णयहरू

१. निर्णय नं. १ प्रस्ताव नं. १ माथि छलफल गर्दा यसको शनिचौतारी सामुदायिक वन उपभोक्ता समितिबाट सह-आयोजना बाट श्री शनिचौतारी सामुदायिक वन उपभोक्ता समितिका अध्यक्षहरूको सहमति प्राप्त भएको छ।

वा शि त उ रि धि यो

- (क) झाड़ारी पुल देखि यस शनिचौतरी सा.व.उ.स को प्रत्येक भाग छुट्टै भवन भण्डारी राजमार्ग सम्म सडक निर्माण गरिदिनु पर्ने ।
- (ख) शनिचौतरी सा.व.उ.स को हेमन्ति ठडा क्षेत्रीय संस्थाला सा.व.उ.स को वृत्तमध्य भवन नमिक बनाइदिनु पर्ने ।
- (ग) जिन्ना बाट स्वानेपातिमाथरक्षणाई संस्थाको भवन निर्माण गरिदिनु पर्ने ।
- (घ) भरी पम्पिङ्ग उप. आयोजना निर्माण गर्ने क्रममा चल शनिचौतरी सा.व.उ.स.का उपकोम्पाहस्ताई क्रमता अनुशार रोजगारीको उपस्थिति गरिदिनु पर्ने ।
- (ङ) वडा नं. १० मि.प्र. पर्ने विद्यालयभन्दाई शौतिक पुर्वोच्चार निर्माण गरिदिनु पर्ने ।
- (च) वडा नं. १० मि.प्र. रहेका खिंचाई बुलासक भर्ना गरिदिनु पर्ने ।
- (छ) पल शनिचौतरी सा.व.उ.स को जुन्नागा लई पुर्ण तारवार गरिदिनु पर्ने ।

३. निर्माण नं. ३ प्रस्ताव नं. १ माथि इलजाम गर्दै स्वानेपाति हेरचाह सुशासन तथा पुर्वोच्चार सहयोग आयोजनाका प.सं. ०६९१८० च.नं. ६३ उपोन्नि र लोकवृष्टि स.पा. प.सं. ०६९१८० च.नं. ६८ दूध तथा वि.न.पा का प.सं. ०६९१८० च.नं. २९०६ उपोन्नि शनिचौतरी सा.व.उ.स.को प्राथमिक वातावरणीय परिष्करण लक्ष्य को लागि स्वकामि पत्र भन्दा आएको हो पत्र प्रकाशित गर्ने विषय उरिधो ।



 मन्त्रीको कार्यालय
 २०७१/२१

Annex 8: Proposed Muck disposal site location



Annex 9: Essential Stages and Procedure of the GRM System

Stage 1: Receive, Registration, and Acknowledgment of the Grievance

The project will guarantee the presence of multiple means through which stakeholders can submit their grievances. Affected individuals and other stakeholders can submit grievances at Tier 1 through:

- Submit complaint forms online through the Municipal website. In cases where complainants are unable to read or write or are unfamiliar with the grievance process, PIU staff will provide assistance in completing the complaint form. In such instances, the designated PIU staff member will officially register the grievance by utilizing the project's provided complaint form.
- Utilize the contact information of the Municipalities, such as email addresses and phone numbers.
- Engage with the project through its social media channels, including Facebook.
- Use postal services to send grievances to project offices at both the Federal and local levels.

Upon the reception of grievance, the PIU staff or an assigned representative will assign a distinct grievance number to each complaint to facilitate easy monitoring. Subsequently, within a span of 5 working days, the staff will formally acknowledge the receipt of the complaint either through a phone call, text message, or a face-to-face meeting with the complainant. This acknowledgment will include the grievance registration number, enabling the complainant to utilize it as a reference to track the complaint's status. They can do so by visiting the Social Development Unit at the Municipality or by contacting the designated staff member. If the grievance is not clearly understood or if additional information is required, the assigned staff will reach out to the complainant during this phase to seek further clarification.

Step 2: Evaluate and Investigate the Grievance

Within 10 days of receiving the grievance, the complaint will undergo screening, and its significance will be assessed. If the grievance is deemed admissible and pertains to the project or arises from project activities, the Level 1 GRM committee will commence

processing the complaint. In cases where the grievance is unrelated to the project or not triggered by project activities, it will be declined, and clear reasons for this decision will be communicated to the complainant, along with an explanation.

Step 3: Formulate a Resolution and Respond to the Complainant

Following the investigation, the committee will endeavor to propose a resolution as expeditiously as possible, and this proposal will be made in consultation with the complainant and other relevant stakeholders, no later than 15 days after the initial screening and assessment at Level 1. The resolution will be conveyed to the complainant through the appropriate channel. If the complainant is satisfied with the resolution, the committee will request written acceptance of the resolution.

Step 4: Forward the Grievance if the Complainant Remains Dissatisfied

If the complainant rejects the proposed resolution or if the Level 1 GRM system fails to provide a resolution within the specified timeframe, the Level 1 GRM system will refer the case to the Level 2 GRM system, overseen by the Chief of the Project Management Unit (PMU) at the Department of Water Supply and Sewerage Management (DoWSSM). The Level 2 GRM committee, comprised of three members, including the Social Development Specialist from DoWSSM, will facilitate the achievement of an acceptable resolution. This committee will aim to produce a resolution within 20 working days. Should the complainant accept the resolution, it will be implemented, and the grievance will be formally closed upon the completion of the implementation.

Step 5: Pursue Legal and Other Formal Remedies

If the complainant declines the proposed resolution, they are free to explore legal and other formal avenues available at the local or national level.

Annex 10: Attendance of the Public Consultation

आज मिति २०८० जेठ १० गते नेपाल सरकार र विश्व बैंकको सहलगानीमा सुर्खेत जिल्लाको वीरेन्द्रनगरमा स्थानीय क्षेत्रगत सुशासन तथा पूर्वाधार सहयोग आयोजना अन्तर्गत निर्माण हुने भेरी पम्पड उप-आयोजनाको प्रयोजनकालागि गरिने कक्षावर्ग तथा सामाजिक प्रभाव मूल्याङ्कन (ESIA) दस्तावेज तयारीका लागि वीरेन्द्रनगर नगरपालिकाका न. १०११, अमृत डाँडाका स्थानीय वासिन्दा हरूसँग लक्षित समूह दस्तावेजको आयोजना गरियो। उक्त दस्तावेजमा स्थानीय वासिन्दा हरूले आयोजनासँग सम्बन्धित विषयमा विभिन्न चारौं व्यक्त गर्नु भयो। दस्तावेजका मुख्य विषयहरू देहाय बमोजिम थिए:

१. आयोजना अन्तर्गतको कक्षावर्गीय र सामाजिक जोरिवम व्यवस्थापनका खवालहरू।
२. आयोजनाबाट पर्ने सबै कक्षावर्गीय र सामाजिक प्रभाव अनुमीकरणका आधारहरूबारे जानकारी।
३. आयोजनाबाट स्थानीय वासिन्दाले राखेका चारौंहरू

उपस्थित

क्र	नाम	ठेगाना	हस्ताक्षर
१	प्रेम को चुनारा	वी.ए.ए.पी ११ काठमाडौं	
२	दलेश्वर शर्मा	" " "	
३	विर्मा विश्व	" " "	
४	भोविसरा सुनार	" " "	
५	नैनकला शर्मा	" " "	
६	स्तिता अधिकारी	" " "	
७	अमृता शर्मा	" " "	
८	सरस्वती थापा	" " "	सरस्वती थापा
९	बाल कुं शर्मा	" " "	
१०	पार्वती खराल	" " "	पार्वती
११	अरत चुनारा	" " "	
१२	मनसरा सुनार	" " "	मनसरा
१३	तुल्सी परियार	" " "	तुल्सी
१४	कमला शर्मा	" " "	कमला
१५	लक्ष्मी परियार	" " "	लक्ष्मी

क्र.सं.	नाम	ठेगाना	हस्ताक्षर
१८	विनय रत्नलाल	वी.पि.पि.पी.११ (अ.२००५)	
१९	कै.पु. डोपाध्याय	" "	रुद्र
१९	रविशु.पु. शर्मा	" "	रुद्र
२०	रमेश खड्का	" "	रुद्र
२१	जगन्ना परीयार	" "	
२३	अजित परियार	" "	
२५	गोविंद परीयार	" "	
२४	कुल की रानी	" "	
२५	धनरत्न विश्वकर्मा	" "	धनरत्न
२६	वीर की चुनारा	" "	वीर
२६	तारा पु. आचार्य	" - " - "	तारा
२८	ग्राम की धरि	" - " - "	
२९	चक्रा सुनार	" - " - "	चक्रा
३०	जैलरा "	" - " - "	जैलरा
३१	विपना परीयार	" - " - "	विपना
३२	देव कुमारी वि.क.	" - " - "	देव कुमारी
३३	इमर चुनारा	" - " - "	
३४	गोपाल परीयार	" - " - "	गोपाल
३४	होत्रकला खड्का	" - " - "	खड्का
३५	चन्द्रा सुनार	" - " - "	सुनार
३६	रौप का डांडी	" - " - "	
३६	कुर्मी चुनारा	" - " - "	कुर्मी
३८	रत्ना चुनारा	" - " - "	रत्ना
३९	मनिन रत्नल	कानपुर	मनिन
४०	संडगीता चुनारा	" - " - "	संडगीता

उपरोक्त २० टो जेठ १९ गते नेपाल सरकार र विश्व बैंकको सहयोगमा सुर्खेत जिल्लाको वीरेन्द्रनगरमा खानेपानी क्षेत्रगत सुशासन तथा पूर्वाधार सहयोग (आयोजनाको) प्रयोजनाका लागि गरिने वातावरण तथा सामाजिक प्रभाव मूल्याङ्कन (ESIA) दस्तावेज तयारीका लागि वीरेन्द्रनगर नगरपालिका वडानं ११, अखण्डका स्थित मेरी सामुदायिक वनको उपमोका समितिका पदाधिकारी तथा सदस्यहरू (वीन वा वडानं ०८ र १२ का वसिन्दा) सँग लक्षित समूह दलफलको आयोजना गरियो। यस दलफलमा देख्य बमोजिमका विषयमा दलफल गर्दै विभिन्न सुझाव प्राप्त भएको थियो।

दलफलका विषयहरू

१. आयोजना अन्तर्गतको वातावरणीय तथा सामाजिक जोखिम र तिनको व्यवस्थापन सम्बन्धी।

२. आयोजना निर्माणका क्रममा सामुदायिक वन क्षेत्रमा पर्ने सन्ने प्रभाव र तिनको न्यूनीकरणका उपायहरू।

३. क्रम कारिणहरू गर्नुपर्ने बृक्षरोपण सम्बन्धी योजना।
उपस्थिति:

क्र.सं.	नाम	पद	हस्ताक्षर
१	शेर बहादुर खिँडे	अध्यक्ष	कोशी
२	जोम कुमारी (विडावडी)	सचिव	कोशी
३	उदयरा शाही	सदस्य	कोशी
४	नाराज शाही	"	कोशी
५	भीमराज शाही	"	कोशी
६	देवीसरा सुवेदी	"	देवीसरा
७	लज्जामती पन्त	"	कोशी
८	सिद्धार्थ पन्त	"	कोशी
९	शेर बहादुर थापा	"	कोशी
१०	दान व. शाही	उपस्थितिमा नभएको	कोशी
११	जोम कुमारी	"	कोशी
१२	मोहन सुमाल	डिएमसी	कोशी
१३	नाराज शाही	"	कोशी

आज मिति २०८० जेष्ठ ११ गते नेपाल सरकार र विश्व बैंकको सहलगनीमा सुर्खेत जिल्लाको वीरेन्द्रनगरमा खानेपानी क्षेत्रगत सुशासन तथा पूर्वाधार सहयोग आयोजना अन्तर्गत निर्माण हुने भेरी पम्पिङ उपआयोजनाको प्रयोजनका लागि गरिने वातावरण तथा सामाजिक प्रभाव मूल्याङ्कन (ESIA) दर्तावेज तयारीका लागि वीरेन्द्रनगर स्थित दलित महिला संघ (FED) का प्रदाधिकारी न्यू टर्ग तथा सदस्य-उपग्रह संचार कमीटि तथा अन्य सरोकारवाला टोलीसम्मिलित परामर्श बैठकमा देहाय बमोजिमका विषयमा दलफल गरियो :

दलफल गरिएका मुख्य विषयहरू:

१. आयोजना अन्तर्गतको वातावरणीय र सामाजिक जोखिम व्यवस्थापनका सर्वाल हुनु
२. भेरी पम्पिङ उपआयोजना सम्बन्धमा तयार गरिएका वातावरणीय तथा सामाजिक दर्तावेज टोलीको द्वारा परिचय
३. आयोजना निर्माण र कार्यान्वयन पत्रिका लाई सम्बन्धी र समतामूलक बनाउन सम्बन्धी पाठ सुझाव टोली माथि दलफल
४. ESIA सम्बन्धी परिचय, यसको आवश्यकता र महत्त्व आदि।

क्रम	नाम	पद	संस्था	हस्ताक्षर
१	म.म. सुता	अध्यक्ष	दलित महिला संघ	म.म.
२	रवीन्द्ररा वली	सचिव	दलित महिला संघ	रवी
३	परिष्कृत चौडेल	अध्यक्ष	बन्सेक	परिष्कृत
४	अनिताबेल	सदस्य		अनिता
५	मिता विप्रबेमा	प्रदेशाध्यक्ष	दलित महिला संघ-पूर्व	Mita
६	मोहि प्रसाद सापकावा	सदस्य	आवाज	मोहि
७	सर्मला नेपाली	सदस्य	दलित महिला संघ	सर्मला
८	शैला परिपार	सदस्य	" " "	शैला
९	डा.र. नेपाली	अध्यक्ष	" " संघ	डा.र.नेपाली

नाम	पद	संस्था	हस्ताक्षर
मधुसूता शर्मा	कार्यकारी निर्देशिका	सोमनाथ महिला विकास समिति	गुणेश
दीपा शर्मा	सहायिका	सोमनाथ विकास समिति	गुणेश
विद्या आचार्य	प्राथमिक अधिकारी	शकल महिला समूह	गुणेश
चम्पा विक	सहायिका	कालिका महिला संघ	गुणेश
मन आचार्य	सामाजिक विद्वान	WASGA SP	गुणेश
रमण कुमार जोशी	व्यवसायिक विद्वान	"	गुणेश
श्रीवा विक	सहायिका	दलित महिला संघ	गुणेश
शुभा शर्मा नेपाली	"	" " "	र-प-स-स
निर्मला सैन्धवी	सहायिका	शकल महिला समूह	गुणेश
पिन्का शर्मा	अध्यक्ष	सुभाष - दलित	गुणेश
मदन शर्मा	सहायिका	फेडरेशन, सुर्खेत	गुणेश

आज मिति २०८० जेठ ११ गतेका दिन वीरेन्द्रनगर नगरपालिकाका नगर प्रमुख श्री मोहन माया भण्डारी (बखल) ज्यूको अध्यक्षतामा बैठक बसि नैपाल सरकार र विश्व बैंकको सहयोगातीमा सुरेन्द्र जिम्बाको वीरेन्द्रनगरमा रवानापाती क्षेत्रगत सुशासन तथा पुर्वाधार सहयोग आयोजनाको प्रयोजनका लागि गरिने वातावरण तथा सामाजिक प्रभाव मुल्याङ्कन (ESIA) दस्तावेज तयारीका लागि वीरेन्द्रनगर नगरपालिकाका उप प्रमुख ज्यू ताराकात पद्म अध्यक्ष ज्यूहरू र गैर सरकारी संस्थाका पदाधिकारी ज्यूहरू तथा अन्य संस्थाकार वातावरणको समितिका परामर्श बैठकमा देहाय बमोजिमका विषयमा छलफल गरियो।

छलफल गरिएका मुख्य विषयहरू

- १- आयोजना अन्तर्गतको वातावरणीय र सामाजिक जोखिम व्यवस्थापनका सर्कलहरू।
- २- भैरी पम्पिङ्ग उप आयोजना सम्बन्धमा तयार गरिएका वातावरणीय तथा सामाजिक - दस्तावेजहरूको दृष्टि परिक्षण।
- ३- आयोजना निर्माण र कार्यान्वयन प्रकृष माई समारोही र समता मुलक बनाउने सुझाव प्राप्त सुझावहरू माथी छलफल।
- ४- (ESIA) सम्बन्धी परिक्षण यसको आवश्यकता र महत्व आदि।

प्रतिपति

क्र.सं.	क्र.सं.	नाम	पद	संस्था	सहताक्षर
	१	मोहनमाया भण्डारी	नगर प्रमुख	वी.ने.पा. सुरेन्द्र	
	२	नितकण्ठ खनाल	नगर उप प्रमुख	- " - "	
	३	डा. ज. के. शर्मा (पदा)	नगर अध्यक्ष	" - "	
	४	नौक बस्नेत (शहरी)	नगर अध्यक्ष	वी.ने.पा. सुरेन्द्र	
	५	मो. र. व. ख. ख.	नगर अध्यक्ष	वी.ने.पा. सुरेन्द्र	
	६	पद्म ताराकात	"	वि.ने.पा. सुरेन्द्र	
	७	समानता नेपाल	का.सं.	वि.ने.पा. सुरेन्द्र	

क्र.सं	नाम	पद	संस्था	हरताका
7	जगद्व 9. 1/9/99	डेप्युटी		
8	भूपेन्द्र प्रसाद के. डे. न	कर्मचारी	सुन्दर नेपाल संस्था	
10	प्रकाशमान देवकोटा	अध्यक्ष	वि. 5 99	
11	चलेन गिरी	सचिव	नालायक संस्था	
12	विमेश खत्री	अध्यक्ष	वि. 7. पा. 9	
13	रामेश शोरी	डि. प्रो. वि.	नेपाल संस्था	
14	रतन के. ओ. ड.	अध्यक्ष	वि. 1. पा. 99	
15	रविन्द्र खत्री	अध्यक्ष	वि. 1. पा. 99	
16	विमल शमशेर	अध्यक्ष	वि. 1. पा. 99	
17	धरम पांडे	अध्यक्ष	वि. 1. पा. 99	
18	नविन रावल	अध्यक्ष	वि. 1. पा. 99	
19	अरुण अधिकारी	अध्यक्ष	वि. 1. पा. 99	
20	रोशन कुमार जोशी	अध्यक्ष	वि. 1. पा. 99	
21	मयाराम शर्मा	अध्यक्ष	वि. 1. पा. 99	
22	शिका बराल	अध्यक्ष	वि. 1. पा. 99	
23	सुभाष चण्ड	अध्यक्ष	वि. 1. पा. 99	
24	माधुरी शौपमे	अध्यक्ष	वि. 1. पा. 99	
25	सुस्मा रेग्मी	अध्यक्ष	वि. 1. पा. 99	
26	देव प्रसाद पुर्जाल	अध्यक्ष	वि. 1. पा. 99	

आज मिति २०८० जेष्ठ १५ गते नेपाल सरकार र विश्व बैंकको सहलगनीमा निर्माण हुने शलनेपाली क्षेत्रगत सुशासन तथा पूर्वाधार सहयोग आयोजना अन्तर्गत सुर्खेत जिल्लाको कीरे-कुंगर नगरपालिकामा आयोजना निर्माण हुने मेरी पब्लिक उपक्रमायोजनाको लागि तयार गरिने वातावरण तथा सामाजिक प्रभाव मूल्याङ्कन (ESIA) देखीवेज तयारीका लागि सुर्खेत उपत्यका शलनेपाली संस्था अन्तर्गतका स्कीम नं० १ र ३ का उपमोका देखीवेज देहाय समोतिमुका विषयवस्तु टोलमा लक्षित समूह दलफलको आयोजना गरियो ।
दलफल गरिएका मुख्य विषयवस्तु टोल

१. पुस्तकित मेरी पब्लिक उपक्रमायोजनाको आयोजना क्षेत्रका पश्चि-दा टोलको जीवनमा पार्ने प्रभाव सम्बन्धमा
 २. आयोजनाको दिगोपन सम्बन्धमा
 ३. आयोजनाको सांस्कृतिक - सामाजिक प्रभावका सम्बन्धमा
- क. उपरोचति

क्र.सं.	नाम	पद	हस्तासुर
१	विष्णु बहादुर बुढा	उपमोका - स्कीम १	
२	भगवती पाण्डे	" " १	भगवती पाण्डे
३	गुणराज खसेला	" " १	
४	चन्द्र बहादुर शाल	पब्लिक/उपमोका - १	चन्द्र बहादुर
५	सरस्वती नेपाली	उपमोका स्कीम नं० ३	सरस्वती
६	दिलकुमारी सुनार	" " "	
७	राधा महरा	" " "	राधा महरा
८	सैगल बुढा	" " "	
९	हरिहर चपाङ	" " "	हरिहर चपाङ
१०	परशुराम विक	" " "	परशुराम

आज मिति २०८० जेठ १४ गते नेपाल सरकार र विश्वबैंकको सहकार्यमा निर्माण हुने खानेपानी श्रेष्ठगत सुशासन तथा पूर्वाधार सहयोग आयोजना अन्तर्गत सुरवेत जिल्लाको वीरेन्द्र नगर नगरपालिकामा निर्माण हुने मेरी पम्पिड उप आयोजनाको प्रयोजनका लागि तयार गरिने वालावरठा, ^{तथा सामाजिक} प्रभाव मूल्यांकन (ESIA) देखावेज तयारीका लागि वीरेन्द्र नगर नगरपालिकाका विभिन्न वडाका अगुवा व्यक्तित्वहरूसँग देहाय बमोजिमका विषयवस्तुमा लक्षित छुट्टै दस्तावेज (FJD) को आयोजना गरियो। सुरवेत खानेपानी उपत्यका खानेपानी संस्थाको कार्यालयमा उक्त बैठकको आयोजना गरिएको थियो।

दस्तावेज गरिएका मुख्य विषयवस्तु हरू

१. मेरी पम्पिड उप आयोजनाले आयोजना क्षेत्रका वासिन्दा हरूको जीवनमा पार्ने सकारात्मक प्रभावका सम्बन्धमा।
२. सम्पत्ति हरूको निर्णय द्वारा पालिका द्वारा सम्बन्धमा।
३. आयोजनाको दिगोपन सम्बन्धमा।
४. आयोजनाले पार्ने सक्ने सकारात्मक असरका सम्बन्धमा।
५. आयोजनाका सामाजिक-सांस्कृतिक प्रभावका सम्बन्धमा।

क्र.सं.	नाम	पद	हस्ताक्षर
१.	श्रीगज बहादुर बुढा	वडाध्यक्ष, वार्ड नं. - २	
२.	श्रीबालाराम बिजारी	ट्रान्जिनिअर, सु. उ. खा. स.	
३.	श्री गीता सुनार	उपाध्यक्ष, शिवशक्ति साव. उ. स.	
४.	श्री विमालिख (सुनार)	डिप्टी, रेकर्ड सामुदायिक उ. स.	
५.	श्री मालती विक	क्रियाध्यक्ष, दलित सेवा संघ	
६.	डा. पद्मलाल चण्ड	शा. प. उ. अ. अध्यक्ष, जि. डे. व. क. सुरवेत	

Annex 11: Proposed Plantation Sites

Proposed plantation site in consultation with the Mayor of Birendranagar Municipality



Gaushala area at Bheri Community Forest

Shahid Park area at Bhairab Community Forest

