नेपाल सरकार

विज्ञान, प्रविधि तथा वातावरण मन्त्रालय

वतावरण मूल्याङ्कन शाखा

पत्र संख्या :
च.नं. : ९८५२

मितिः २०७१/१०/२२

विषयः वातावरणीय प्रभाव मूल्याङ्कन (EIA) प्रतिवेदन स्वीकृत गरिएको वारे ।

श्री शहरी विकास मन्त्रालय
सिंहदरवार, काठमाण्डौ

तहाँ मन्त्रालयको च.नं. ३९६, मिति २०७१/०१/२५ को पत्रसाथ प्राप्त श्री बिरगंज उप-महानगरपालिका (आयोजना कार्यान्वयन ईकाई, मभ्औला शहर एकीकृत वातावरणीय सुधार आयोजना) प्रस्तावक रहेको वारा जिल्लाको इटियाही र विश्रामपुर गा.वि.स. मा निर्माण संचालन हुने स्यानिटरी ल्याण्डफिल साईटको वातावरणीय प्रभाव मूल्यङ्कन (EIA) माथि कारवाही हुदा, प्रस्तावकद्वारा पेश गरिएको सोहि प्रस्तावको परिमार्जित EIA प्रतिवेदन November, *2014* लाई निम्नानुसारका शर्तहरु सहित स्वीकृत गरिएको व्यहोरा नेपाल सरकार (सचिवस्तर) मिति २०७१/१०/१९ को निर्णयानुसार अनुरोध छ ।

२०७१/१०/२२
सुरेन्द्र राज पन्त
(ईकोलोजिष्ट)

शर्तहरु:

१. प्रस्ताव कार्यान्वयन तथा सञ्चालनको क्रममा थप/नयाँ नकारात्मक प्रभावहरु देखिएमा प्रस्तावक स्वयंको खर्चमा निराकरण/न्यूनिकरण गर्नुपर्नेछ ।
२. स्वीकृत वातावरणीय प्रभाव मूल्यङ्कन अनुसारले आयोजना सञ्चालनमा आएको २ वर्ष पुग्ने मिति वारे यस मन्त्रालयलाई अग्रिम लिखित जानकारी गराई वातावरणीय परीक्षण कार्यमा सहयोग गर्नु पर्नेछ ।
३. प्रस्ताव कार्यान्वयनको सिलसिलामा गरिने वातावरणीय अनुगमन/मूल्यङ्कनको वार्षिक प्रतिवेदन तयार गरी यस मन्त्रालय लगायत सरोकारवाला निकायलाई नियमित रुपमा पठाउनु पर्नेछ ।

Birgunj Sub-Metropolitan City
STIUEIP
Birgunj
Reg. No. ५८०१०६१/०६२
Date २०६१/१११९०

बोधार्थ:
श्री बिरगंज उप-महानगर पालिकाको कार्यालय
बिरगंज, पर्सा

श्री वातावरण विभाग
कुपोण्डोल, ललितपुर

(आवश्यक कार्यार्थ ।)

कार्यालयको ठेगाना :
सिंहदरबार, काठमाडौं
नेपाल

कार्यालयको टेलिफोन नं. :
४२११७३४, ४२११६४१, ४२११२२६
४२११२४६, ४२११८२४, ४२११७३७
४२११५८६, ४२११६२८

फ्याक्स नं.:
९७७-१-४२११२५४

इमेल:
info@moste.gov.np

वेव साईट:
www.moste.gov.np

Government of Nepal
Ministry of Urban Development
Department of Urban Development and Building Construction
(DUDBC)

Secondary Towns Integrated Urban Environment Improvement Project (STIUEIP)

ENVIRONMENTAL IMPACT ASSESSMENT

of

Sanitary Landfill Development for Improved Solid Waste Management of Birgunj Municipality

Proponent

Birgunj Sub-metropolitan City
Project Implementation Unit (PIU)
Secondary Towns Integrated Urban Environment Improvement Project
(STIUEIP)
Birgunj, Parsa, Nepal

Submitted to

Ministry of Science, Technology and Environment
Through
Department of Urban Development and Building Construction
And
Ministry of Urban Development

Prepared by

SMEC International Pty Ltd., Australia in association with Brisbane City Enterprises Pty Ltd., Australia, CEMAT Consultants (P) Ltd., Nepal and Building Design Authority, Nepal

November 2014

कार्यकारी शारांस

आयोजनाको पृष्ठभूमि:

८.१ आयोजनाको परिचय:

नेपाल सरकारको शहरी विकास मन्त्रालय अन्तर्गतको शहरी विकास तथा भवन निर्माण विभागले मझौला शहर एकिकृत शहरी वातावरण सुधार आयोजनाको लागि एसियाली विकास बैंकको 2650-NEP शिर्षक अन्तर्गत ऋण सहयोग प्राप्त गरेको छ । यस आयोजनाका लागि कार्यकारी निकाय शहरी विकास मन्त्रालय अन्तर्गतको शहरी विकास तथा भवन निर्माण विभाग तथा यस्लाई कार्यान्वयन गर्ने निकायका रुपमा विरगञ्ज उप-महानगरपालिका रहेको छ ।

यस आयोजनाको वातावरणीय प्रभाव मूल्यांकनको कार्य गर्न विरगञ्ज उप-महानगरपालिकाका लागि बारा जिल्लाको इटियाही र बिश्रामपूर गा.वि.स. को वा.नं. ७ र ९ मा फोहोर मैला व्यवस्थापनका लागि Sanitary Landfill को निर्माण तथा संचालन गर्ने रहेको छ ।

Sanitary Landfill को वातावरणीय प्रभाव मूल्यांकनका साथै निर्माण तथा व्यवस्थापनको लागि सम्पूर्ण इन्जिनियरिङ्ग सर्भे गर्न Design and Supervision Consultant मार्फत यस आयोजनाको प्रस्तावकको हैसियतमा Contract document आदीको काम उप-महानगरपालिका कार्यालय, आयोजना कार्यान्वयन इकाई र मझौला शहर एकिकृत शहरी वातावरण सुधार आयोजना कार्यरत छ ।

विरगञ्ज उप-महानगरपालिकाले सन २०१६ मा बार्षिक १२,२२८ टन फोहोरमैला उत्पादन गर्ने भएकोमा त्यस पछिका १५ बर्षभित्र जम्मा २५४,३१२ टन फोहोरमैला उत्पादन हुनेहुदां ठिक पारिएको ४.९२ हेक्टर कोष्टमा उक्त फोहोर Landfill गर्दा भरिने हुन्छ । यस अनुसार Landfilling गर्ने फोहोरमैलाका लागि वातावरणीय प्रभाव मुल्यांकन गर्नुपर्ने हुन्छ ।यस्का लागि चाहिने १० हेक्टर भन्दा बढि कुल १०.७६ हेक्टर जग्गा लाग्ने छ।

वातावरण संरक्षण ऐन (२०५३) र नियमावली (२०५४) को प्रावधान अनुसार यस्को वातावरणीय प्रभाव मूल्यांकनको प्रतिवेदन तयारपारी वातावरण मन्त्रालयबाट स्विकृति प्राप्त गर्नु पर्दछ । यो प्रतिवेदन वातावरण संरक्षण नियमावली को प्रावधानको धारा ७,१० र उपधारा १,२,४ र ६ अनुसार तयार पारिएको हो ।

८.२ आयोजनाको अध्ययन प्रकिया:

यो आयोजनाको संपूर्ण अध्ययन प्रकृया वातावरण संरक्षण ऐन २०५३ र वातावरण संरक्षण नियमावली २०५४ को परिधिमारही तल दिईए अनुसार रहेको छ । यो प्रतिवेदन नेपालका विभिन्न ऐन तथा नियमावलीका साथै आयोजना स्थलको स्थलगत अध्ययन तथा स्थानिय जनमानस र गा.वि.स., उप-महानगरपालिका, जि.वि.स. का प्रतिनिधिहरु संगको अन्तर्कृयाबाट तयार पारिएको हो ।

यस्का लागि आयोजना सम्बन्धमा प्राप्त सम्पूर्ण संबन्धित प्रतिवेदन, डिजाइन, रिपोर्ट, नक्सा आदि तथा आयोजना ईलाकाका बारे Secondary documentS संकलन गरिएको हो ।

फोहोरमैला व्यवस्थापन सम्बन्धि अन्तराष्ट्रिय विज्ञका साथै फोहोरमैला व्यवस्थापन सम्बन्धि इन्जिनियर, अर्थबिद, सामाजिक विकास सम्बन्धि विज्ञ, Surveyors and Enumerators आदि बहुपक्षिय विज्ञहरुबाट उक्त स्थानको स्थलगत अध्ययन गरिएको थियो । यसबाट भौतिक वातावरण, रासायनिक वातावरण, जैविक वातावरण, सामाजिक, आर्थिक तथा सांस्कृतिक वातावरण सम्बन्धमा प्रत्यक्ष तथा परोक्ष प्रभाव सम्बन्धका सुचानाहरु संकलन तथा परिक्षण गरिएको थियो ।

त्यसपछि प्रत्यक्ष तथा परोक्ष प्रभावहरुलाई छुट्याइयो । सबै प्रत्यक्ष तथा परोक्ष प्रभावहरुलाई वातावरणीय दृष्टिबाट हालमा पर्ने र पछि पर्नसक्नेगरि छुट्याई त्यस्को Extent, Duration र Magnitude बारे खाका तयार गरियो ।

मिति २०७०/९/६ (December 21, 2013) मा श्री नेपाल राष्ट्रिय माध्यामिक विद्यायलध, नगवा १९, बीरगंज, पर्सामा सार्वजनिक सुनुवाईको कार्यक्रम संचालन गरिएको थियो जस्मा करिब ६० जना स्थानिय मानिसको सहभागिता थियो । यस्मा स्थानिय स्तरका प्रतिनिधिहरुले यो आयोजना सम्बन्धमा आफ्नो मन्तब्य, भनाइहरु तथा सुझावहरु दिएका थिए जुन यस प्रतिवेदनको अनुसुची ६ मा दिईएको छ । Relevant Stakeholders हरुबाट प्राप्त सिफारिस पत्रहरु अनुसुची ७ मा राखिएको छ ।

वातावरणीय प्रभाव मुल्यांकनको अध्ययन प्रकृयाको अन्तमा विज्ञान, प्रविधि तथा वाताारण मन्त्रालयले सम्बन्धित सबै संस्था तथा व्यक्तिहरुबाट राय, सुझाव र comment प्राप्त गर्नका लागि राष्ट्रिय दैनिक पत्रिकामा ३० दिने सार्वजनिक सुचना प्रकासित गरेको थियो ।

यो आयोजनाको लागि तयार पारिएको वातावरणीय प्रभाव मूल्यांकनको प्रतिवेदन आयोजना स्थलका साथै relevant libraries र सार्वजनिक स्थलमा समेत राखिएको थियो ।

अन्तिम रुपमा यो आयोजनाको वातावरणीय प्रभाव मूल्यांकनको प्रतिवेदन विभिन्न व्यक्ति संस्थाहरुका साथै विज्ञान, प्रविधि तथा वातावरण मन्त्रालयमा भएको विज्ञहरु सम्मिलित छलफलबाट प्राप्त राय, सुझाव आदिलाई समेत समावेसगरी तयार पारिएको हो ।

८.३ आयोजनाको विवरण:

प्रस्तावित विरगञ्ज उप-महानगरपालिकाको फोहोरमैला व्यवस्थापनको Sanitary Landfill Site निर्माण गर्ने स्थल नेपालको मध्यमाञ्चल विकास क्षेत्रस्थित बारा जिल्लाको इटियाही र विश्रामपुर गा.वि.स. को वा.नं. ७ र ९ मा अवस्थित छ । प्रस्तावित Sanitary Landfill Site को पश्चिम सिमानामा विरगञ्ज उपमहानगरपालिकाको वा.नं. १९ मा अवस्थित सिंगाहा नदि रहेको छ । उक्त Sanitary Landfill Site सम्म जानकालागि विरगञ्ज उपमहानगरपालिकाको वा.नं. १९ देखि ग्राभेल सडक पहिले देखिनै रहेको छ ।

विस्तृत सर्भे र डिजाइनको बेला, ठोस फोहरमैलाको नथिचिएको बेलाको आयातन ३२० kg/m^3 आंकलन गरिएको छ र विरगञ्जको सन २०१६ मा कुल ठोस फोहर उत्पादन प्रतिदिन ५६.७०१ टन अनुमान गरिएको छ । प्रस्तावित ६०% फोहर समेटिने अवस्थामा सन २०१६ मा ठोस फोहर उत्पादन ३३.९६५ टन प्रतिदिन हुने देखिन्छ । अन्तमा, ल्याण्डफिल साइटको कोष्टमा पुग्ने ठोस फोहर दैनिक २३.७७५ टन (वार्षिक १२,२२८ टन) अनुमान गरिएको छ । २०११ को जनगणना अनुसार त्यहांको १९ वडाको जनसंख्या १३५,९०४ रहेको र वार्षिक १.९१% ले जनसंख्या बृद्धि हुने आंकलन गरिएको छ ।

विरगञ्ज उप-महानगरपालिकाको १९ वटै वडामा फोहोर संकलन सेवा संचालित छ जस्मा २ वटा टिपर र ८ वटा ट्रयाक्टर - ट्रेलर दैनिक फोहोर ओसार्ने कामका लागी प्रयोग गरिएको छ । यस्तो सेवा केन्दीय स्तर अन्तर्गत र वडा लेभलबाट गरिदै आएको छ । केन्द्रिय स्तर अन्तर्गत उप-महानगरपालिकाले २९० जना सफाई गर्ने कर्मचारीबाट रोड नं. १, रोड नं. २ र रोड नं. ३ मा २ वटा टिपरहरु संचालनमा ल्याएको छ ।

विरगञ्ज उप-महानगरपालिका भित्र जम्मा ३७ वटा फोहोर उठाउने ठाउंहरु संचालनमा रहेका छन् । उप-महानगरपालिकाको अधिनमा कुनैपनि स्थाई फोहोर थुपार्ने ठाउंहरु छैनन् । सबै फोहोर थुपार्ने ठाउंहरु व्यक्ति विशेसका होचा जग्गा र नदि किनारा हुन् ।

फोहोरमैला व्यवस्थापन कम्पोनेन्टले Integrated Approach को अवलम्वन गर्ने छ जस्मा त्यस्ता कार्यको पुनरावलोकन र पुरै system को segregation र collection गरि स्तरोन्नति गर्ने, 3R को प्रयोगगरि कम्पोष्टमल वनाउने, sanitary landfill site सम्म ढुवानी गरि अन्तिम तहलगाउनुका साथै आवस्यक उपकरण तथा ढुवानीका साधन किन्ने र sanitary landfill site वनाउने आदि गर्ने छ । यस्को पुरा डिजाइन २० बर्षको अवधिकालागि गरिएको छ ।

प्रस्तावित फोहोरमैला व्यवस्थापनमा निर्धारित ठाउंबाट फोहोर जम्मा गर्ने र सिधै sanitary landfill site मा ढुवानी गर्ने, फोहोर तह लगाउने ठाउंसम्म बाटो बनाउने तथा भैराखेको बाटोलाई स्तरोन्नति गर्ने, buffer zone को विकास गर्ने तथा landfill cells, प्रशासनिक सुविधा, कम्पोष्टिङ्ग सुविधा आदि र गाडि पार्किङ्गको सुविधाहरुको विकास गर्ने रहेको छ ।

प्रस्तावित आयोजना संचालनमा ल्याउनका लागि VAT सहितगरि जम्मा रु ४७९,९९२,०७७.२७ लाग्ने तथा यस्को ५% भैपरीआउने र ५% भौतिक निर्माणमा भैपरिआउने रकम समावेस हुनेछ ।

यो मझौला शहर एकिकृत शहरी वातावरण सुधार आयोजना अन्तर्गत वन्ने Landfill Site को विकासको काम सुरु भएको २ बर्षमा सम्पन्न हुनेछ । यस्मा एक बर्ष Defects निवारण कार्यकालागि allocate गरिएको छ । यस्को संचालन योजनामा site preparation, landfill cell को निर्माण, soil cover, Leachate treatment, gas को व्यवस्थापन, record keeping को काम, closure activities र वातावरणीय अनुगमन आदि रहेका छन् ।

८.४ वातावरणीय नीति, योजना, नियम तथा निर्देशिकाका प्रावधानहरु:

यस्कालागि हाल भएका वातावरणीय नीति, योजना, नियम, निर्देशिका र विभिन्न निकायहरुलाई पुनरावलोकन गरिएको तथा आयोजना संचालन गर्दा त्यसबाट हुन सक्ने कठिनाईहरु का वारेमा चर्चा गरिएको छ ।

८.५ बर्तमान वातावरणीय अवस्था:

भौतिक तथा रासायनिक वातावरण:

प्रस्तावित SLF १०.७६ हेक्टर एरियामा तराइको समथर जग्गामा अवस्थित छ । यो landfill site एरिया तराइको कृषिजन्य उब्जाउ भएको मुख्यतथा Quaternary sediments मा रहेको छ । यो जग्गा माटो, silt र वालुवा युक्त अत्यन्त fertile soil युक्त छ । विरगञ्ज उप-

महानगरपालिका उत्तर-दक्षिण ८ कि.मि. र पूर्व-पश्चिम ४ कि.मि. फैलिएको छ। यस्को उचाई दक्षिण सिमानामा करिब ७८ मिटर तथा उत्तर सिमानामा ८७ मिटर उचाईमा छ।

त्यहांको हावापानी धेरै तातो र उष्ण (wet) गरम सहित sub-tropical मनसुन युक्त छ। Sanitary landfill site सम्म सिंगाहा नदिको बेसिन एरिया बिरगञ्जको पूर्वि इलाका १२ बर्गकिलोमिटरमा फैलिनुका साथै २० वर्षे flood level ७९.४८६ मिटर र flood discharge ४९.०२ क्युविक मिटर/सेकेन्ड छ। सिंगाहा नदिको नजिक sanitary landfill site को पश्चिम पट्टी भुमिगत पानीको सतह भुमिको सतह भन्दा ४.२७ मि. देखि ३.७५ मि. सम्म छ भने पूर्व पट्टि भुमिको सतहबाट २.५० मि. मुनी रहेको छ।

Sanitary landfill site को जमिनको उपयोगको हकमा बिरगञ्ज उप-महानगरपालिकाको स्वामित्वमा रहेको थोरै वनस्पति युक्त खेतियोग्य जमित पर्दछ। प्रस्तावित sanitary landfill site को वनोट स्थिर रुपको हुनुका साथै त्यहा कुनै किसिमको भुक्षय भेटिएको छैन जुन चांही waste landfill को कामकालागि हानिकारक होस्। बारा जिल्लाको इटियाही र विश्रामपुर गा.वि.स. मा रहने प्रस्तावित sanitary landfill को एरिया कुनै किसिमको ओद्योगिक उत्सर्जन, परिवहन आहोर दोहोर र अन्य infrastructure को विकास नभएको ग्रामिण इलाका भएकाले हालको स्थितिमा त्यहांको बायू तथा ध्वनी प्रदूषणको स्थिति राम्रो मानिएको छ।

Landfill site एरियामा कुनै किसिमको बाहिरी मानिसको बसोबास (Encroachment) नभएकोले त्यहां कुनै किसिमको ध्वनी प्रदूषण छैन। परिवहनको ओहोरदोहोर पनि अति न्युन तथा नजिकै कुनै किसिमका उद्योगहरु पनि छैनन्। प्रस्तावित sanitary landfill site देखि सबभन्दा नजिकको बस्तिमा पुर्वमा २ कि.मि. टाढा पर्ने विश्रामपुर गा.वि.स. को मुसरवा र करीब २ कि.मि. उत्तर पुर्व स्थित इटियाही बस्ति रहेको छ। विरगञ्ज उप-महानगरपालिकाको वा.नं. १९ को नगवा Sanitary Landfill Site को पश्चिममा अवस्थित करिब १ कि.मि. को दुरीमा ग्राभेल ओछ्याएको बाटोसंग जोडिएको छ।

प्रस्तावित Landfill site को पश्चिमपट्टी अवस्थित उत्तरबाट दक्षिण तिर बग्ने सिंगाहा नदिको सतही पानीको स्तर ठिकै रहेको देखिएको छ। त्यहांको भूमिगत पानीको गुणस्तर पिउने प्रयोजनका लागि योग्य भेटिएको छ।

जैविक बातावरण:

प्रस्तावित Landfill Site को एरिया कुनै नियमावलीले construction को काममा बाधा पुऱ्याउने restricted area, सांस्कृतिक, एतिहासिक र पुरातात्विक महत्वका मन्दिर (monuments) भएका, कन्जरभेसन एरिया, Wild life National Parks आदियुक्त ठाउंमा पर्दैन। प्रस्तावित Sanitary Landfill Site पर्सा Wildlife Reserve बाट करिब ३१ कि.मि. दक्षिणमा पर्दछ।

प्रस्तावित Sanitary landfill Site कृषियोग्य जमिनमा अवस्थित छ तथा पश्चिम पट्टी ०.३० मि. देखि ०.९० मि. सम्मको गोलाकार [illegible] ७३३ वटा मझौला रुखहरु छन् जस्लाई आयोजनाको विकासको क्रममा हटाउनु पर्ने देखिन्छ।

सामाजिक, आर्थिक तथा सांस्कृतिक बातावरण:

२०११ को राष्ट्रिय जनगणना अनुसार इटियाही र विश्रामपुर गा.वि.स. को जम्मा जनसंख्या ६६५९ र ६३२१ रहेको र सो ठाउंका घरपरिवार संख्या ९७७ र ९१२ रहेको छ। इटियाहीमा पुरुषको संख्या ५३.२४% र महिलाको संख्या ४६.७६% तथा बिश्रामपुरमा सो संख्या ५२.४६% र ४७.५४% रहेको छ।

१० बर्ष भन्दा माथिका करिब ५२% जनसंख्या आर्थिक रुपमा सकृय छन्। धेरै जसो आर्थिक रुपमा सकृय जनसंख्या कृषि पेशामा छन् र अरु व्यापारी, जागिरे र श्रमिक छन्। त्यहांको शिक्षित प्रतिशत ६९.५०% रहेको जस्मा ७९.१२% पुरुष र ५७.७२% महिला छन्। बिश्रामपुर गा.वि.स. मा शिक्षित प्रतिशत ३९.४% र इटियाहीमा ३२.७% छन्।

प्रस्तावित Landfill Site एरियामा आयोजना प्रभावित परिवार कोहीपनि छैनन्। सबै चाहिने जग्गा बिरगञ्ज उपमहानगरपालिकाको स्वामित्वमा रहेको छ। त्यहां अस्थाई संरचना र अनधिकृत बसोबास नभएकोमा जग्गा प्राप्ती (acquisition) र पुनर्वासको प्रकृयामा कोही पनि पर्दैनन्। बिरगञ्ज उपमहानगरपालिकाको कुनै पनि आफ्नो सम्पतिलाई असर नपर्नेगरि फोहोरमैलाको संकलन र ढुवानी गरिने छ।

आयोजना क्षेत्रमा देखिएका common disease हरुमा पखाला र स्वास प्रस्वास (gastroenteritis) सम्बन्धिका रोगहरु पर्दछन्। यस्तो हुनुमा पानीको गुणस्तरमा ह्रास, ठिक संग ढलको निकास नहुनु र फोहोरमैलाको व्यवस्थापन नहुनु हो।

बिरगञ्ज उप-महानगरपालिकाको फोहोरमैला ट्रेक्टर र खुला trailors को प्रयोगगरि संकलन तथा ढुवानी गरिन्छ। स्थाई sanitary dumping site नभएका कारण दैनिक करिब ४७.५७ टन फोहोरमैला नदि किनारा, तलाउ, बाटोको संगम स्थल र खुला ठाउंमा जहां पायो त्यही थुपारीने गरिएको छ। यस्ता फोहोर थुपारिएका नजिकका ठाउंहरु स्वास्थका दृष्टिले अत्यन्तै जोखिमपूर्ण स्थानमा पर्दछन्।

बारा जिल्लामा जम्मा ४३ वट उद्योगहरु रजिष्टर भएकामा अधिकांस उद्योगहरु त्रिभुवन राजमार्गको नजिक विरगञ्ज र पथलैया सडकको बिचमा रहेका छन् । २००७ को तथ्यांक अनुसार १६३ वटा भन्दा बढि विभिन्न किसिमका उद्योगहरु विरगञ्ज उप-महानगरपालिका भित्र पर्दछन् । त्यस्मा मुख्यतया साबुन, प्लाष्टिक, टेक्सटाइल, गार्मेन्ट, धातु, छाला, डिष्टिलरी, औषधिजन्य आदी छन् ।

प्रस्तावित आयोजनाबाट कुनैपनि सांस्कृतिक तथा मनोरन्जनात्मक resources लाई असर नपार्ने देखिन्छ भने त्यहांको मानिसको हालको स्थितिमा भएको रहनसहनमा त्यहांको सरसफाइ र स्वास्थ्यमा हुने स्तरोन्नतिबाट फलदायी तथा सकारात्मक असर पर्ने देखिन्छ ।

८.६ बातावरणीय प्रभाव तथा निराकरणका उपायहरु:

फाइदाजनक प्रभावहरु:

आयोजनाको निर्माण तथा संचालनबाट १५ बर्ष सम्म त्यहांको फोहोरमैला तहलगाउने भएकाले बिरगञ्ज उमपहानगरपालिकालाई सोझै फाइदा हुनेछ । त्यसपछि त्यहांका स्थानिय मानिसको चाहना अनुसार उक्त ठाउंलाई मनोरञ्जनात्मक ठाउंको रुपमा विकास गरिने छ ।

स्थानिय बासिन्दालाई पुग्ने रोजगारीको अवसरलाई पनि मुख्यसंग पर्खिएको फाइदा हुन सक्छ । यो आयोजनाले त्यहांका स्थानिय बासिन्दालाई उनिहरुको योग्यता अनुसार कामको अवसर प्रदान गर्ने छ । यो आयोजनाले स्थानिय बासिन्दालाई दक्षता हासिल गर्ने तालिमका लागि प्राथमिकता दिने छ । त्यस्तो तालिमले विभिन्न निर्माण कार्यका लागि तिनिहरुको दक्षता बढाउन मद्दत पुऱ्याउने अपेक्षा गरिएको छ ।

आयोजनाको निर्माण र संचालनबाट त्यस ठाउंको व्यापार बढ्ने, घर बहालमा लाग्ने आदी भई आर्थिक गतिविधि बढ्ने छ । आयोजनामा कार्यरत कामदारलाई स्थानिय उब्जाउको बेचविखनको सुबिधाबाट त्यहांका बासिन्दाको आयमा बढोत्तरी हुने छ । विकासका कृयाकलापलाई सहयोग गरिने भएबाट धेरै कुराको दिगो व्यवस्था हुने देखिन्छ ।

विकास भएको संरचनाले फोहोरमैलालाई Sanitary Landfill मा विसर्जन गर्ने छ । त्यस्बाट हालको Low Land, पोखरी आदीमा विसर्जन गरिने फोहोरमैलाबाट हुने बातावरणीय जोखिममा कमि आई स्वास्थ्य सम्बन्धि जोखिममा कमि आउनुका साथै जनस्वास्थ्य र सफाइको स्थितिमा बढोत्तरी हुन्छ ।

यो आयोजनाबाट फोहोरलाई कम्पोष्टिङ्गको व्यवस्था हुनेछ । स्थानिय बासिन्दाको माग भएमा उप-महानगरपालिकाले सिफारीस गरेअनुसार आयोजनाको विकासबाट असर पर्ने नजिकैका किसानहरुलाई सस्तो मुल्यमा उत्पादित मल उपलब्ध हुनेछ । नेपाल सरकार र विरगञ्ज उप-महानगरपालिकाबाट पाइने विकासका सुविधाहरु आयोजनाको संचालन अवधिभर पाइने छ ।

प्रतिकुल प्रभावहरु तथा न्युनिकरणका उपायहरु:

भौतिक तथा रासायनिक वातावरण:

हालमा आयोजना क्षेत्रको नदिकिनारामा असर परेको छैन । तथापी आयोजना निर्माणका वेला जमिनको instability र माटोको क्षयहुने भएबाट नदि किनाराका slope मा असर पर्न सक्छ । आयोजनाको design drawings अनुसार राम्रो संग योजना गरिएको drainage channels र पक्कि ढलान गरिएको गाडी पार्किङ्ग र धुने तथा maintenance क्षेत्रका साथै कालो पत्र गरिएको सडकको प्रावधान रहेको छ । नदी किनाराहरुमा ग्याबियन युक्त पर्खाल र mattress सहितका किनारा protection सहितका कार्यहरुको अवधारण रहेको छ । सबै Embank slope हरु घांसका बिउको किसिम सहित राख्नेगरि design मै व्यवस्था गरिएको छ ।

आयोजना निर्माणका गतिविधिबाट स्थानिय बातावरणमा बायू प्रदूषण थपनिुका साथै सो ठाउमा ध्वनिको मात्रा समेत बढ्ने छ । निर्माणबाट निस्किएका फोहोरहरु सिंगाहा नदीमा पस्न सक्नेछन् । यस्बाट नदिको पानीको गुणस्तरमा बदलाव हुने छ । अन्य आयोजनाहरुको निर्माण गर्दा यस्ता प्राकृतिक बातावरणका बदलावहरु सामान्य हुन्छन् । ध्वनीको मात्रालाई कमगर्न आयोजनाले रातको समयमा ध्वनी उत्पादन हुने कृयाकलापहरुलाई रोक्ने, निर्माणको अवधि घटाउने, ठिक ठाउंमा ध्वनी barriers राख्ने तथा ध्वनी उत्पादन गर्ने इन्जिनहरुमा ध्वनी कमगर्ने उपकरण फिट गरिने छ । संभावित बायूको गुणस्तरको बदलावलाई कमगर्न आयोजनाले नियमित पानीको फोहोरा सहितको site damp tarpaulin बाट stockpile material लाई ढाक्ने, ढुवानी गर्ने वाहनहरुलाई ढाक्ने तथा निर्माणका वाहनहरुले नेपाल सरकारका requirement comply गर्ने आदी छन् ।

प्रस्तावित Landfill site बाट धेरै concentrated Leachate generate गर्ने छ । त्यस्तो Leachate लाई त्यसै बग्न दिएमा सतही तथा भूमिगत पानीलाई प्रदुषित पार्न सक्छ । यसलाई व्यवस्था गर्न Detail design मा दिएको छ । Perforated pipe को माध्यम बाट Leachate लाई सुरक्षित संग जम्मागरी फाल्नु पुर्व त्यसलाई प्रसोधन गरिनेछ । यस्तो व्यवस्थाको सहि ढङ्गबाट कार्यान्वयन गरिनेछ ।

फोहोरमैला कुहिएर निस्कने नराम्रो दुर्गन्ध अवगुण मध्येको एक हो । यस्ता फोहोरलाई ढुवानीका वाहनमा पुरै ढाकेर एकाविहानै Landfill site मा लग्नसके दुर्गन्धलाई कम गराउन सकिन्छ । वरिपरिको बस्तिलाई दुर्गन्धबाट बचाउन Landfill site को वरिपरि Buffer zone को व्यवस्थाका साथै दिने पिच्छे तह लगाइएको फोहोरलाई माटोले पुर्नेगरी प्रस्ताव गरिएको छ ।

फोहोरमैलाको कुहिने प्रक्रियाबाट निस्कने Methane र अन्य gases लाई जम्मा गरिने तथा कुनै किसिमको प्रसोधन नगरी gas vent pipe मार्फत वातावरणमा पठाइने छ । यस्को ज्वलनसिलताका कारण समयमै सतर्कता अपनाइएन भने आगोको जोखिमहुने संभावना हुन्छ । Landfill site मा आपतकालिन अवस्थामा उल्लेख्य मात्रामा आगो निभाउने उपकरणहरुको बिकल्प राखिएको छ ।

फालिएको फोहोरलाई दिनहौं माटोले पुर्नेकाम गरिने छ । पुरा अवधिकालागि जम्मा ११,६४४ क्युविक मिटर पुर्ने माटोको आवश्यक हुनेछ । यस्तो पुर्ने माटो आयोजना वरिपरि उपलब्ध छैन । यस्तो माटो हेटौडाको ५ कि.मि. पश्चिम रातोमाटे बाट तथा त्रिभूवन राजपथको नजिक प्रस्तावित Landfill site बाट ५० कि.मि. उत्तरबाट ल्याउनु पर्ने हुन्छ । Borrow sites को संचालनबाट Landscape लाई असर गर्नसक्ने, elevation level लाई बदल्न सक्ने र माथिल्लो भागको मलिलो माटोलाई क्षति गर्न सक्ने तथा धुलो प्रदुषण बढ्ने हुन जान्छ । Borrow sites को भिरालो अस्थिर हुन सक्नेभई भूक्षय र पहिरोको खतरा हुन सक्छ । त्यसैले ढाक्नका लागि प्रयोग गरिने माटो भिक्दा योजनाबद्ध रुपमा राम्रोसंग भिकिनेछ । स्थायी side slopes चाहिने ठाउंमा पर्खाल बनाइनेछ । Borrow sites मा ४५° भन्दाकमको भिरालोलाई निरन्तरता दिइनेछ । पानीबाहिर पठाउनका लागि ठिक तवरको नालाको व्यवस्था हुने छ ।

कामदारहरुलाई unsafe handling of the waste बाट हुन आउने स्वास्थ्य सम्बन्धि कठिनाइ हरुबारे राम्रोसंग जानकारी गराइनेछ । ठिकसंग फोहोरमैलालाई handling गर्न लगाइनेछ । आयोजनाले Landfill site मा helmets, masks, ear plugs इत्यादी safety measures उचित मात्रामा भए नभएको बारे हेर्नेछ । Landfill site मा नभैनहुने तथा चाहिने आपतकालिन औषधि सहितको medical kit उपलब्ध गराउनेछ । Landfill site मा कामगर्ने कामदरहरुलाई नियमित तथा निश्चित अवधिमा स्वास्थ्य परिक्षण गर्ने व्यवस्था गरिनेछ ।

Landfill site मा भिंगा, किरा, चराचुरुङ्गी र मुसाको माध्यमबाट फैलिने दुर्गन्ध र रोगहरुबाट वरिपरीका मानिसमा स्वास्थ्य र सुरक्षा सम्बन्धि खतरा हुने हुन्छ । आयोजनाले फोहोर फाल्ने, फिजाउने र compaction को प्रकृया फोहोर खसाल्ने वित्तिकै गरिने व्यहोरा विस्वस्थ पार्न चाहन्छ । फोहोर फालेपछि दिनहौं माटोले पुरिनेछ । बधशालाहरुबाट ल्याइएको फोहरलाई तह लगाउंदा विशेष ध्यान दिइनेछ ।

निर्माणको peak period का वेला दैनिक करिब १५० जना सम्म कामदारहरुको आवश्यक पर्ने आकलन गरिएकोछ । ति कामदारहरुले दैनिक ५३ किलोग्राम ठोस फोहोर production गर्नेछन् । Unsanitary फोहोर फ्याक्ने प्रचलनबाट सतही तथा भूमिगत पानी प्रदुषण हुन्छ र समाजमा झगडा हुनसक्छ । कामदारहरुले बस्ने क्याम्पमा पिउने पानी, ढल निकास र फोहोर तहलगाउने सुविधाहरु हुनेछन् । उत्पादन भएको फोहोरमैलालाई छुट्याइने छ । Plastic, steel, glasses आदि नकुहिने फोहोरलाई पुनप्रसोधन गरिने छ । कुहिने खालका फोहोरलाई जम्मागरि Design and supervision consultant/municipality को approval र relevant stakeholders को consent मा उचित ठाउंमा तहलगाइने छ । निर्माणका वेला ठोस फोहोरलाई खुल्ला किसिमले बाल्ने कार्यलाई कडाइका साथ रोक लगाइने छ ।

जैविक वातावरण:

प्रस्तावित Landfill site को विकास कार्यको क्रममा विरगञ्ज उप-महानगरपालिकाको स्वामित्वको जग्गामा रहेका सम्पूर्ण रुखहरुलाई हटाइने छ । धेरैजसो रुखहरु प्रस्तावित Landfill site को पश्चिम पट्टी सिमानामा सिंगाहा नदीको नजिक विभिन्न गोलाईका जम्मा ७३३ वटा रहेका छन् । Buffer area/strip बनाउन Landfill site को वरिपरि बृक्षारोपण गरिने छ । जम्मा ७३३० वटा रुख रोपी त्यस्लाई हुर्काउन ५ बर्ष सम्म हेरचाह गरिने छ ।

आयोजनाले रुखहरुलाई ठिकसंग चिनो लगाउने, ढाल्ने र बुट्टा लगाउने कार्य तथा तोकिएको ठाउंमा ढुवानी गर्नका लागि सम्बन्धित निकाय (उप-महानगरपालिका, गा.वि.स., जि.वि.स., जिल्ला वन कार्यालयहरु संग समन्वय गर्ने छ ।

भिंगा, किराफट्यांग्रा, चराचुरुङ्गी र मुसा मार्फत फैलिने दुर्गन्ध र रोगहरुबाट सामुदायिक स्वास्थ्य र सुरक्षामा खतरा पर्ने छ । आयोजनाले फोहोरलाई ढुवानीका वाहनबाट झार्ने वित्तिकै फिजाउने, फाल्ने तथा compaction operation को कार्य गर्ने कुरामा विस्वस्त पार्न चाहन्छ। फोहोरलाई दिनै पिच्छे माटोले पुर्ने छ ।

सामाजिक, आर्थिक तथा सांस्कृतिक वातावरण:

प्रस्तावित आयोजनाको Landfill Site का लागि चाहिने सम्पूर्ण जग्गा विरगञ्ज उप-महानगरपालिकाको स्वामित्वमा रहेकोले जग्गा सम्बन्धिमा कुनै किसिमको नकारात्मक प्रभाव पर्ने छैन ।

Sanitary Landfill Site को संरचना बनाउदा बसोबास भएको इलाका त्यहांबाट टाढा रहेकाले कुनै किसिमको प्रभाव पर्ने छैन । त्यसो भएपनि फोहोर ढुवानी गर्दा व्यक्तिगत तथा सार्वजनिक उपभोगहरु, उनिहरुसंगको पहुंच अनि गह्रौं उपकरण र ढुवानीका साधनबाट असर पर्न सक्ने हुन्छ । संरचना बनाउंदा केही कुरामा असर पर्ने भएमा तुरुन्तै त्यस्को लेखाजोखा र ध्यान पुऱ्याउन आयोजनाले पहल गर्ने छ । आयोजनाले

ठेकेदार जुनसुकैका उपकरण वा बढि भएका सामानहरु, अनावस्यक थुपारिएका र नचाहिने बाधा पर्‍याउने आदि तथा साइटमा भएका कुनै यान्त्रिक फोहोर र काममा नआउने अस्थायी तवरमा थुपारिएका सामानहरुलाई त्यसै नराखी हटाउने कुरामा विस्वस्त पार्न चाहन्छ।

संरचना बनाउंदा मजदुरहरु तथा आयोजनामा काम गर्ने कर्मचारीहरु उच्च ध्वनी र धुलोको मात्रामा घुलमिल हुनसक्ने छन्। आयोजना भएको ठाउंमा धेरै मानिसहरु रहंदा बस्दा निस्कने ढललाई त्यसै बगाउदा पानी प्रदूषित हुनगई कठिनाइ पर्न सक्छ। यस्बाट स्वास्थ्य सेवाका लागि बढि चाप हुन जान्छ। आयोजनाले बाहिरी कामदारहरुका लागि आयोजना इलाकामा बस्नका लागि camp बनाइ दिने छ। त्यस्ता compsite मा पिउने पानीको व्यवस्था, pit latrines र अत्यावस्यक औषधि सुविधा सहितको स्वास्थ्यचौकि आदीको व्यवस्था गरिने छ जस्बाट कामदार र तिनका आश्रितबाट त्यहांको भइरहेका सेवा तथा सुविधाहरुमा कमि आउन नपाओस।

सावधानीका उपायहरु अवलम्वन गर्दा गर्दै पनि गम्भीर किसिमका दुर्घटनाहरु नहुने कुरालाई भने पूर्णरुपमा नकार्न चाहि सकिदैन।

निर्माणका कृयाकलाप र धुलोबाटोमा सवारीका साधनहरु गुडाउदा निस्कने धुलो र धुंवा तथा स्वास प्रस्वास सम्वन्धि रोगका कारण स्थानिय बासिन्दा तथा कामदारहरुको स्वास्थ्यमा समस्या पर्न सक्छ। सबै निर्माणमा कामगर्ने कामदार र कर्मचारीहरुलाई दुर्घटना बिमाको व्यबस्था गरिने छ।

निर्माण कार्यमा संलग्न कामदरहरुलाई नचाहिदो, नसोचेको दुर्घटना र धुलो तथा धुंवा बाट हुने सम्भावित असरलाई कम गराउन आयोजनाले प्रचुरमात्रामा helmets, masks, air plugs, road signs, warning signals आदिको व्यवस्था गर्ने कुरामा विस्वस्थ पार्न चाहन्छ। सुख्खा समयमा स्थानिय वासिन्दालाई धुलोबाट बचाउन पानीको फोहोरा स्प्रे गर्ने व्यवस्था गरिने छ।

एकै ठाउंमा बेग्ला बेग्लै सामाजिक तथा सांस्कृतिक पृष्ठभूमि भएका मानिसको ठूलो जमात थुप्रिनु र साथसाथै पैसाको कारोवार बढ्ने हुंदा मादक पदार्थको सेवन, तास-जुवा र वेश्याबृतिले असामाजिक कृयाकलाप बढ्न गई स्थानिय र बाहिरी कामदार विच बैमनस्यता निम्त्याउन सक्छ। कामदारहरु स्थानिय बासिन्दाका लागि nuinsance साबित नपार्न तथा माथिका कृयाकलापहरु गर्नलाई अंकुस लगाउनलाई स्थानिय राजनैतिक पार्टिहरु सम्मिलित एक स्थानिय कमिटि बनाइने छ। सुरक्षा गार्ड बाट नियमित अनुगमन गर्ने कामको व्यवस्था पनि गरिने छ। स्थानिय समुदाय र आयोजनामा काम गर्ने कामदार विच राम्रो सम्बन्ध र सुझबुझ कायमगरि तिनीहरुमा harmonious सम्बन्ध कायम राख्ने एक जना जन सम्पर्क अधिकृत नियुक्त गरिने छ।

आयोजनाका कृयाकलापहरु संचालन बाट पुरातात्विक र धार्मिक स्थलहरुलाई कुनै किसिमको असर पर्ने छैन।

Landfilll site को एक देखि दुई किलोमिटर नजिक कुनै किसिमको वस्ति नभएतापनि वरिपरिका बासिन्दाले उनिहरुको घर जान Landfill site सम्म जाने बाटोको प्रयोग गर्ने छन्। स्थानिय बासिन्दाले पुरै इलाकामा दुर्गन्ध तथा फोहोर फैलिन गई अस्वस्थ्यकर हुनजाने कारण देखाई Landfill site का लागि फोहोर ढुवानी गर्न अवरोध श्रृजनागर्न सक्ने छन्। यसबाट sanitary landfill site सम्म फोहोर मैला ढुवानीमा स्थानिय वासिन्दा बाट अवरोधहुने खतरा हुने छ। आयोजनाले सबै फोहोर ढुवानी गर्ने वाहनहरुलाई राम्रोसंग छोपी त्यस्ता ढुवानीका वाहनहरुबाट कुनै किसिमको फोहोर बाटोमा नझर्ने कुरामा विस्वस्थ पार्न चाहन्छ। Lanfill site मा जाने बाटोलाई राम्रोसंग व्यवस्थित गरिराख्ने छ।

फोहोर झार्दा र compaction गर्दा कामदरहरु उच्च ध्वनीको मात्रामा घुलमिल हुन सक्छन्। नयां कोष्ठ बनाउदा, फोहोरलाई ढुवानीका साधनबाट झार्दा र कोष्ठहरुलाई ढाक्दा त्यहा कार्यरत कामदारहरु धेरै मात्रामा निस्कने धुलोमा घुलमिल हुन सक्छन्। निस्किएको gas emission बाट कामदारहरुको मानव स्वास्थ्यमा असर पर्न सक्छ। त्यसैले संभव भएसम्म कामदरहरुलाई बचावटका उपकरणहरु प्रदान गर्नुका साथै बचावट संम्बन्धि प्रयोगका तरिकाहरु लागु गरिने छ। त्यस्ता इलाका संवेदनसिल हुने हुनाले काम नभएका अनधिकृत मानिसहरुलाई त्यहां भित्र पस्नमा बन्देज गरिने छ। स्थानिय बासिन्दाको माग अनुसार बिस्त्रित डिजाइनमा कामदर र वरिपरिका मानिसका लागि एउटा स्वास्थ्य चौकी राख्ने प्रावधान राखिएको छ।

८.७ बैकल्पिक बिश्लेषण:

दिइएका कामको उदेश्य परिपूर्तिका लागि र आयोजनालाई अगाडी बढाउन धेरै बिकल्पहरुको बिश्लेषण गरिएको छ। आयोजनाको बैकल्पिक बिश्लेषणमा मुख्य तया आयोजना स्थल, आयोजनाको डिजाइन, यस्को प्रविधि चुन्ने र संचालन प्रकृया र आयोजना संचालन गर्दा र नगर्दाको स्थिति आदीमा आधारित छ।

८.८ बातावरणीय व्यवस्थापन योजना:

वातावरणीय व्यवस्थापन योजनाले आयोजना संचालन बाट उत्पन्न हुने मुख्य चुनौतिहरु र प्रतिकुल असरहरुको न्युनिकरणका उपायहरु तथा अनुगमनको तालिका र जवाफदेहीताको प्रस्ताव गरेको छ। यस योजनाले वातावरणीय व्यवस्थापनको भूमिका र दायित्व, आयोजनाको डिजाइन र विभिन्न कृयाकलापको निर्माण व्यवस्थापन, स्थानको निरिक्षण, अनुगमन र रिपोर्टिङ्ग, रेकर्डस र corrective measures, improvement, प्रपोजल तथा अनुगमन कार्यका लागि लागत आंकलन आदि प्रस्ताव गर्ने छ।

शहर भित्रका कुनैपनि आयोजना व्यवस्थापन तथा अनुगमन कार्यका लागि शहरी विकास मन्त्रालय कानुन संम्मत जवाफदेही हुन्छ । डिजाइन र सुपरभिजन कन्सल्ट्याण्ट मार्फत PIU, STIUEIP-Birgunj ले वातावरणीय व्यवस्थापन योजनाको व्यवस्थापन र अनुगमन कार्यको कार्यान्वयन गर्ने छ ।

PIU, STIUEIP-Birgunj ले DUDBC/PCO संग समन्वय गर्ने छ र वातावरणीय संरक्षण measures लागु गर्न प्राविधिक सहयोग प्राप्त गर्ने छ । PIU, STIUEIP-Birgunj ले चाहिएको वेला बन तथा भूसंरक्षण मन्त्रालय र विज्ञान, प्रविधि र वातावरण मन्त्रालय संग पनि थप प्राविधिक सहयोग प्राप्त गर्न सक्ने छ । वातावरणीय व्यवस्थापन योजनामा दिइएका measures and requirements हरु लाई ठिकसंग अगाडी बढाउने प्रयोजनका लागि PIU का कर्मचारीले आयोजनाको निर्माण र संचालनका वेला साथ साथ काम गर्ने छन् ।

आयोजना संचालन अगाडी, संचालन अवधिभर र संचालन पछिपनि वातावरणीय न्युनिकरणको design र implementation का लागि जवाफदेखि हुने मुख्य ६ वटा निकायहरु तल दिइए अनुसारको हुने छन्:

- शहरी विकास मन्त्रालय
- DUDBC/PCO STIUEIP
- PIU, STIUEIP-Birgunj
- एसियाली विकास बैंक (ADB)
- Design and supervision consultant (डिजाइन तथा निरीक्षणमा संलग्न परामर्शदाता)
- Construction contractor (निर्माणमा संलग्न ठेकेदार)

यसैगरी अन्य स्थानिय, जिल्ला तथा केन्द्र स्तरीय निकायहरु र आयोजनाको निर्माणबाट असर पर्ने जोकोहीको भूमिका तथा दायित्व (roles and responsibilities) पनि उत्तिकै किसिमले important छन् । यस आयोजनाको प्रस्तावकले ति सवैको विचार बिमर्श र समन्वयको भूमिका निभाउने छ । अन्य निकायहरु निम्न अनुसार छन् ।

- विज्ञान, प्रविधि तथा वातावरण मन्त्रालय (MOSTE)
- जिल्ला वन कार्यालय
- उपमहानगरपालिका / जि.वि.स.

वातावरण संरक्षण ऐन तथा नियमावलीको प्रावधान अनुसार विज्ञान, प्रविधि तथा वातावरण मन्त्रालय वातावरणीय प्रभाव मुल्यांकन प्रतिवेदनको अन्तिम रिपोर्टलाई स्विकृत गर्न र वातावरणीय clearance दिन responsible (जवाफदेही) निकायका रुपमा रहेको छ । यो मन्त्रालयले आयोजना संचालनको २ बर्ष पछि वातावरणीय अडिट समेत गर्नुपर्ने छ ।

सवैजसो वातावरणीय न्युनिकरणमा लाग्ने लागत in-built design and estimate मा समावेस गरिएको छ । तथापी in-built design and estimate मा वेग्लै समावेस नगरिएका र ठेकेदारको bill of quantity मा समावेस गर्ने रकम वातावरणीय व्यवस्थापन योजनामा राखिएको छ । यस आयोजनामा वातावरणीय व्यवस्थापनका लागि इष्टिमेट गरिएको लागत ने.रु. ११,२२६,२७०/- छ । आयोजनाले वातावरणीय व्यवस्थापनका लागि आयोजनाको जम्मा लागतमा २.३४ प्रतिशत रकमको व्यवस्था गरेको छ ।

८.९ निष्कर्ष तथा सुझाव:

आयोजना निर्माण तथा संचालन गर्ने ठांउ नजिक कुनै पनि वातावरणीय दृष्टिले संवेदनसिल इलाका छैनन् । यहां नजिक वस्ति नभएकाले नराम्रो गन्ध, किराहरु जम्मा हुने, rodents र दुर्गन्धबाट मानिसको स्वास्थ्य सम्बन्धि जोखिम तथा झिंगा, किरा, चराचुरुङ्गी र मुसाका माध्यमबाट रोग सर्ने भई वरिपरिको इलाकामा nuisance हुने कुरा त्यत्तिको सान्दर्भिक नहुने देखिन्छ ।

त्यहांको जग्गा हाल पानी लगाइ सकेपछि वगेर जाने गरी धान बालिका लागि प्रयोग गरिरहेकोले फोहोर जम्मा गरिने ठाउंबाट निस्कने Leachate बाट सतही र भूमिगत पानीलाई त्यति प्रदुषित नपार्ने देखिन्छ । Landfill site को डिजाइन अनुसार Leachate जम्मा गर्ने र प्रसोधन गर्नुका साथै पिंधमा तथा vertical slope of waste storage dam मा HDPE sheet liner र clay liner system जडान गर्नुका साथै Leachate ले सतही र भूमिगत पानीलाई प्रदूषित पर्नबाट रोक्ने प्रावधान राखिएको छ । Landfill site मा राखिएको फोहोर कुहिएर Methane र अन्य gas निस्कन्छ । त्यहां जम्मा गरिएको फोहोरको प्रकृति तथा अन्य फोहोर recovery र processing गर्ने कृयाकलाप अनुसार gas जम्मा गर्ने कुवाहरु र flaring station हुने छन् ।

देखिएका र आंकलन गरिएका प्रभावहरुलाई तिनीहरुको significance थाहापाउनका लागि लेखाजोखा गरिएको छ । Landfill site निर्माण तथा संचालनका समयमा पर्न सक्ने प्रतिकुल वातावरणीय प्रभावहरुलाई कम गर्न तथा आयोजनालाई वातावरण मैत्रि बनाउन विभिन्न न्युनिकरणका उपायहरु अवलम्वन गर्न प्रस्ताव गरिएको छ । न्युनिकरणका विभिन्न उपायहरु अवलम्वन गर्दा त्यस्ता वातावरणयि प्रभावहरु कम हुने छन् ।

सुझावहरु:

वातावरणीय व्यवस्थापन योजनालाई bidding document मा समावेश गरीएकोले त्यस अनुसार यो आयोजनालाई कार्यान्वयन गर्न वातावरणीय न्युनिकरणका उपायहरुलाई कडाइका साथ लागु गर्न ठेकेदार बाध्य हुने छन् । यहां प्रस्ताव गरिएको वातावरणीय अभिवृद्धिका कार्यक्रमहरुले त्यहांका स्थानिय प्रभावित जनसमुदायको जिवन स्तरलाई माथि उकास्न मद्दत पुग्ने छ । प्रभावित जनसमुदायका लागि आयोजना निर्माणक समयमा विभिन्न तालिम तथा रोजगारीको अवसरले उनीहरुको जिवनयापनमा वढोत्तरी गराउन मुख्य भूमिका खेल्नेछ ।

आयोजनाको गुण यस्को location, evaluate गरिएका वातावरणीय असरहरु र व्यवहारीक न्युनिकरणका उपायहरु साथै फोहोरमैला व्यवस्थापन तथा श्रोत परिचालन सम्वन्धका हाल भएका पोलिसी र ऐनहरु लाई समेत consider गर्दा यो आयोजना कार्यान्वयनका लागि इजाजत दिन उपयुक्त हुने देखिन्छ । तथापि यो प्रस्तावित Landfill site मा घरायसी फोहोरलाई मात्र फाल्न तथा जोखिमयुक्त फोहोरलाई नफाल्ने कुरा यहां प्रष्ट पारिन्छ ।

EXECUTIVE SUMMARY

1. Introduction

The Department of Urban Development and Building Construction (DUDBC), under the Ministry of Urban Development (MoUD), through the Government of Nepal, has received Loan 2650-NEP: Secondary Towns Integrated Urban Environmental Improvement Project (STIUEIP or the Project), from the Asian Development Bank (ADB). MoUD is the executing agency for the Project, working through DUDBC, and Birgunj municipality is the implementing agencies (IAs).

The EIA study covers the Solid Waste Management component of the subproject with development of Sanitary Landfill at Ward 7 and 9 of Itiyahi and Bishrampur VDC respectively of Bara District for Birgunj Sub-metropolitan City.

Birgunj Sub-metropolitan City, PIU, STIUEIP as project proponent has engaged the Design and Supervision Consultant to undertake Detailed Engineering Survey, Design and Construction Supervision for improvement/development of Sanitary Landfill with infrastructural facilities for management of solid waste for Birgunj City including Environmental Impact Assessment, preparation of contract document for execution of the construction work.

Birgunj Municipality exceeds the required threshold value on solid waste generation as it is estimated at around 12,228 tons per year at year 2016 and total solid waste of 254,312 tons will be filled in the land fill cells area of 4.92 ha during its 15 years life span i.e. year 2030 (DSC design report). Thus it exceeds the threshold value for rate of land filling as well as land filling area (i.e. total area of 10.76 ha that is greater than 10 ha) requiring EIA study.

Subsequently the EPR empowers the Ministry of Science, Technology and Environment (MoSTE) to approve the EIA report. This EIA report has been prepared in accordance with the requirements of the EPR Clause 7, 10 and Schedule 1, 2, 4, and 6.

2. Methodology

The overall procedure followed for this study follows EPA and EPR 1997 and as amended (1999 & 2007). The EIA is prepared in compliance with other GoN legislation, based on field studies and consultation with local people and officials of VDC, DDC, and Municipality.

All relevant literature, design reports, maps and other required information was collected and reviewed during desk study including available secondary data's of the project area.

A field visit was conducted by DSC Environmental Specialist including group of multidisciplinary team of experts comprising Waste Management Specialist (international), Solid Waste Engineer (national), Ecologist, Social Development Specialist, Surveyors and Enumerators. Information on physical, chemical, biological and socio-economic and cultural conditions of the project's direct and indirect impacts was collected.

Impacts have been categorized as direct and indirect. Each of the direct and indirect impacts has further been evaluated in terms of **Extent** (site specific, local and regional); **Duration** (short term, medium term and long term); and **Magnitude** (low, medium and high) based on conditions of the environmental parameter at present, estimated and projected damage of the project.

Around 60 local people were present in the public hearing meeting held on December 21, 2013 (Paush 6, 2070) at Shree Nepal Rastriya Madhyamik Vidhyalaya, Nagwa, Ward No. 19, Birgunj, Parsa. A number of local area representative expressed their views and comments on the project. The public consultation deliberation, suggestions and comments is summarized and given in Annex 6 of this report. Recommendation letters received from the relevant stakeholders is kept in Annex 7.

At the final stage of EIA Study, a public notice of 30 days duration was given in a national daily newspaper by Ministry of Science, Technology and Environment (MoSTE) requesting individual or institutional stakeholders to provide their comments on the EIA report. Copies of the EIA reports were displayed at the project sites as well as at different public places including some relevant libraries.

The final EIA report was prepared upon incorporating comments received from the relevant stakeholders and EIA review committee members present during final presentation of the EIA report on September 03, 2014 at MoSTE.

3. Project Description

The proposed Sanitary Landfill Site for Solid Waste Management of Birgunj Municipality lies in Itiyahi and Bishrampur VDC Ward No. 7 and 9 respectively of Bara District in Central Development Region of Nepal. The Singaha river located on the western boundary of the proposed sanitary landfill site touches Ward No. 19 of Birgunj Sub-metropolitan city. The proposed Sanitary Landfill site is linked with an existing gravel road from Ward No. 19 of Birgunj.

During detail survey and design, the Bulk density of solid waste is estimated at 320 kg/m^3 and the total existing solid waste generation for Birgunj is estimated at 56.609 tons/day for design year 2016. With the proposed coverage of 60%, estimated solid waste generation for base year 2016 is estimated at 33.965 tons/day and the residual waste reaching Landfill cell is estimated at 23.775 tons/day (12,228 tons/year). The census of 2011 officially establishes the population of all 19 wards at 135,904 with annual growth rate of 1.91%.

The Birgunj Municipality provides waste collection service in all 19 wards with two tippers and 8 tractors-trailers. The service is provided at two levels, one is the central-level service and other is ward-level service. At the central-level service, the Municipality controls the main routes namely: Road No. 1, Road No. 2 and Road No. 3 with two tippers and deploying 290 cleaning staffs for street sweeping.

The total number of collection points identified is 37 in respective wards of the Birgunj Municipality. There are no permanent dumpsites under control of Municipality. All the identified areas are lowland areas owned by private parties and river banks.

The SWM component adopts an integrated approach for solid waste management, with review and improvement of the entire system from segregation and collection, through 3R including focus on composting of organic waste, to transportation and final disposal at the sanitary landfill, and thus include procurement of necessary equipment and vehicles and the construction of a sanitary landfill site. The system design is for a planning period of 20 years.

The proposed SWM system includes waste collection from designated location and direct transportation to the sanitary landfill, construction / improvement of access road to the waste processing centre, development of buffer zone, landfill cells, administration facilities, composting facilities, receiving facilities, and parking areas, etc.

The total construction cost needed for the implementation of the sub-project is estimated to be around **NRs 479,992,077.27** (four hundred seventy nine million nine hundred ninety two thousand seventy seven and paisa twenty seven only) including VAT, 5% price contingency and 5% physical contingency (as per design estimate).

The landfill site development work under STIUEIP will be implemented over 2 year's period upon work commencement with the provision of single ICB contract package. One year's defects liability period has been allocated for defects remedial works.

The operational plan enables the site preparation, landfill cell construction, soil cover, leachate treatment, gas management, record keeping activities, closure activities and environmental monitoring (during landfilling and post-closure) to be conducted in a safe, efficient, and environmentally sound manner.

4. Review of Policies, Plans, Laws and Guidelines

The existing policies, plans, laws, guidelines and institutions were reviewed and their implications on the project functioning was outlined.

5. Existing Environmental Condition

Physical and Chemical environment

The proposed SLF with a total area of 10.76 ha is located in the Terai plain. The landfill site area consist plain terrain mainly of quaternary sediments constituting cultivated land. It is composed of very fertile soil mixed of clay, silt and sand. Birgunj Sub-metropolitan city has elongated shape with a maximum north-south length of 8 km and east-west width of 4 km. The altitude ranges from about 78 m in south near border area to 87m in the north.

The climatic condition is sub-tropical monsoon with very hot and wet summer. Basin area of Singaha river up to the Sanitary landfill (SLF) site located at eastern side of Birgunj is 12km^2 having 20 years flood level at 79.486m and flood discharge of 49.02m^3/s. The ground water table at the western part of the SLF near the Singaha river varies between 4.25m to 3.75m below ground level whereas the eastern part possesses 2.50m below the ground level.

The land use type of the SLF is agricultural land with sparse vegetation owned by the Birgunj Municipality. The proposed Sanitary Landfill Site is stable and no traces of soil erosion is detected which is harmful to waste landfill works. As the proposed sanitary landfill area in Itiyahi and Bishrampur VDC of Bara District lies in the rural settings not affected by industrial emissions, vehicular movement and other infrastructures developments, the air and noise of the subproject area is assumed fair at present condition.

The landfill site area does not have any form of noise pollution as such because there is no outside encroachment. The vehicular movement is very low with no industry nearby. The nearest settlement from the proposed SLF is Mushharwa in Bishrampur VDC which is 2km east of SLF and Itiyahi settlement located around 2km North East of SLF. Nagwa ward No. 19 of Birgunj Municipality is around 1km west of SLF connected by existing gravel road.

The surface water quality of Singaha river flowing north to south at the western side of the proposed landfill site is fairly good. The quality of the ground water was noted potable for drinking purpose.

Biological Environment

The subproject area does not fall in any restricted areas, places of cultural, historical and archeological importance / monuments, conservation areas, wild life national parks, and any other places where the law of the land prohibits any construction activities. Parsa Wildlife Reserve is located around 31km north of proposed Sanitary Landfill Site.

The proposed SLF consists of agricultural land with sparse vegetation mostly concentrated at the western part constituting trees of girth size ranging from 0.3m to 0.90m. Total 733 number of trees will have to be cleared for sub-project development.

Socio-economic and Cultural Environment

As per Population Census of 2011, total population of the Itiyahi and Bishrampur VDC is 6,659 and 6,321 and household number is 977 and 912 respectively. Male comprises about 53.24% while female 46.76% for Itiyahi and 52.46% male and 47.54% female for Bishrampur VDC.

About 52% of the Population involved in economic activity above 10 years of age is economically active. Majority of the economically active population is engaged in agriculture followed by trade, service and labor. Total literacy rate is 69.5%, comprising of 79.21% among male and 57.72% among female. Total literacy rate is 39.4% for Bishrampur VDC and 32.7% for Itiyahi.

There are no project affected families within the proposed landfill site area. All the land area is owned by the Birgunj Municipality. Temporary structures and people living illegally within the project area are nil, thus land acquisition and resettlement issues need not to be assessed. The waste collection and transportation will be carried out within the existing footprint without affecting the private properties of Birgunj Municipality.

The common diseases reported for the project area are gastroenteritis and diarrhea. It may be due to poor water quality, lack of proper surface drainage systems and solid waste management.

Solid waste of Birgunj Municipality is collected and transported using tractors and open trailers. In the absence of a permanent sanitary dumping site, a daily estimated 47.57 tons of garbage is being dumped haphazardly along river banks, ponds, by-pass road and open spaces. Nearby areas of those places are prone to serious health hazard.

Around 43 industries are registered and approved in the Bara district most of them concentrated near Tribhuvan Rajmargh in between Birgunj and Pathlaiya road. According to district profile (2007), more than 163 different type of industries are located within the Birgunj municipality. The major types are soap, plastic, textile, garment, metal, leather, distillery, pharmaceutical etc.

The proposed sub-project is not expected to adversely affect any cultural or recreational resources but will increase the existing quality of life values due to the improvement in hygiene and health. Several mitigation measures have been proposed in order to reduce adverse environmental impacts wherever it is necessary.

6. Environmental Impact and Mitigation Measures

Beneficial Impact

The direct benefit from the sub-project will be for Birgunj Municipality whose solid waste will be disposed off for 15 years. Thereafter the site will be developed as a recreational facility depending upon the wish of the local people.

Employment opportunity to local people by the sub-project will be the most awaited benefit. However, these will be considered depending upon their qualification and availability. The sub-project will give first priority to the local people while rendering training program. The training program to enhance their skill in various construction related work will augment their capacity.

With the implementation of the sub-project, there will be increase in economic activities such as business, rental of houses etc. Marketing the local products to the sub-project employees and the construction workers will increase income of the local people. The support for the development activities will ensure its sustainability arrangement.

The developed infrastructure will facilitate in sanitary disposal of solid wastes which will reduce environmental risk associated with health hazard and improve environment, health and hygiene of the people as compared to the present haphazard dumping of solid waste in low land area and ponds.

The sub-project provisions composting center. As per the demand of the local people, the Municipality has been recommended to make an arrangement for sale of compost product in a cheaper rate to the local farmers residing in nearby villages who are indirectly affected by the sub-project development. The support from BSMC and GoN will be continued for the development of the local area during operation phase also.

Adverse Impact and Mitigation Measures

Physical and Chemical Environment

At present, the river bank of the project area is not disturbed. However, during construction, the river bank slope may get disturbed inviting land instability and soil erosion problem. The design drawings include well planned drainage channels and blacktopped roads including concrete pavement over parking and vehicle wash/maintenance area. The river banks are provisioned with bank protection works with gabion walls and gabion mattress. All the embanked slopes are provisioned in the design with broadcasting of grass seeds.

The construction activity will add emission of air pollutant in the local atmosphere and increase noise level at site. The construction wastes are likely to enter the Singaha river. This could change the river water quality. These changes in the natural environment are normal in any construction projects. To reduce noise level, the sub-project will avoid noise generating activities at night; minimize period of construction; place noise barriers at appropriate location and noise reducing equipment will be fitted for noise producing engines. In order to minimize possible changes in air quality, the sub-project will keep the site damp with regular spray of water; stockpiled material will be covered with tarpaulin; ensure delivery vehicles are covered; and ensure construction vehicles comply with GoN requirements.

The proposed landfill site will generate highly concentrated leachate. The leachate could contaminate the surface and ground water if they are allowed to pass into them. These has been taken care by detailed design. Horizontal and vertical lining have been proposed in the

design. The leachate will be safely collected via perforated pipes and treated prior to disposal. Effective implementation of these provisions will be made.

Bad smell is one of the characteristic of solid wastes. This will be minimized by bringing waste into the landfill site as early in the day as possible without undue delay covered properly in the waste carrying vehicle. Buffer zone all around the landfill site and daily cover of disposed waste with clay liner has been proposed to prevent the foul smell spreading in the community.

The decomposition process of the solid waste will generate the methane and other gases which will be collected and released in the environment without any treatment through gas vent pipe. The inflammability could cause fire hazard if precautions are not taken in time. The landfill site will have provision of adequate number of fire extinguishers in case of the emergency.

The disposed waste will be covered daily by the soil. Total 11,644 m^3 of soil cover will be required for the entire period. These cover material is not available nearby the project area. It had to be brought from Ratomate, about 5km south of Hetauda and 50km north from the proposed landfill site located near Tribhuvan Rajpath. The operation of the borrow sites is likely to disturb the landscape, change in elevation level and loss of fertile topsoil and will increase the dust emission. The slopes of the borrow sites could be unstable and might invite erosion and landslide. Extraction of the cover material will be planned properly. Retaining structures will be constructed where required for stable side slopes. Preferably less than 45° slope will be maintained at the borrow sites. Proper drainage will be provisioned to drain out water.

The workforce will be made aware of the health problems that may cause due to unsafe handling of the waste. Proper way of handling of waste will be instructed. Project will ensure adequate safety measures such as provision of helmets, masks, ear plugs etc. are available in the landfill site. A medical kit with necessary emergency medicines will be made available in the landfill sites. Regular and periodic medical check up will be carried out to the staffs working in the site.

There is the risk of community health and safety from odor and diseases transmitted by flies, insects, birds and rats. The project will ensure that the waste disposal, spreading and compaction operation will be carried out as soon as the wastes are unloaded. The waste will be covered daily by clay material. Special attention will be given for the waste brought in from the slaughter houses.

It is estimated that around 150 numbers of workforce will be required during peak period of construction. Around 53 kg of solid waste per day is likely to be produced by the workforce. Pollution of surface and ground water is likely from unsanitary waste disposal practices and could create social conflicts. The labor camp will have provision of proper drinking water, sewerage and waste disposal facilities. The solid waste generated will be separated. Non-degradable waste as plastic, steel, glasses etc. will be recycled while bio-degradable waste will be collected and dumped at proper location approved by Design and Supervision Consultant/Municipality with consent of relevant stakeholders. Open burning of solid waste will be strictly banned during construction.

Biological Environment

The proposed landfill site development works entails clearing of existing trees within the proposed landfill site area owned by the Birgunj Municipality with girth ranging from 0.3m to 1.8m. Most of the trees are located along the western boundary of the proposed landfill site near Singaha River. The number of trees required for felling amounts 733in numbers. Tree plantation will be carried out all around the landfill site (covering 15m strip around 1398m perimeter) for creation of buffer area/strip. Total 7,330 nos of appropriate trees will be planted (including management for 5 years).

The sub-project will coordinate with the concerned authority (Municipality, VDC, DDC, District Forest Office) for proper tagging, felling, stacking and transporting logs at designated location.

There is the risk of community health and safety from odor and diseases transmitted by flies, insects, birds and rats. The project will ensure that the waste disposal, spreading and compaction operation will be carried out as soon as the wastes are unloaded. The waste will be covered daily by clay material.

Socio-economic and Cultural Environment

The proposed sub-project will not have any adverse impact on loss of farmland and other category of lands as the proposed land for landfill site is owned by the Birgunj Municipality.

There will be no impact on development of sanitary landfill site as the site is far away from settlement areas. However, during transportation of waste, there could be impact on public/private utilities, access to them or damages due to heavy equipment/vehicular movement depending upon the methods of transportation. The sub-project will plan for immediate attendance by the service providers to any damages to utilities during construction. The sub-project will ensure keeping the site free from all unnecessary obstructions and storing of disposing of any contractor's equipment or surplus material, and clearing away and removing from the site any wreckage rubbish and temporary works which are no longer required.

The labor and project staffs may be exposed to high noise and dust levels during construction. Concentration of a large number of people in the project sites may create problems in disposal of sewerage and water contamination. These may increase pressure to the health services. The project will establish campsite for the workers from outside of the project area and all outside workers will be housed in the campsite. The camp site will have facilities such as drinking water supply, pit latrines and health clinics along with necessary medicines to the workers and their dependants in the labor camps so that no additional pressure on the existing services and facilities will be created due to workers who come from outside the project area.

In spite of precautionary measures, occurrence of serious accidents cannot be completely ruled out. Construction activities and plying of vehicle in the earthen road will increase dust and gaseous emission, and respiratory diseases may threaten health of the local people and workers. All construction workers and staffs will be covered with accident insurance. In order to minimize the unwanted accidents and possible effect of dust and gaseous emission to construction workers, the project will ensure adequate safety measures such as provision of helmets, masks, air plugs, road signs, warning signals etc. To minimize dust to local people, provision of water spray will be made during the dry season.

The concentration of large number of people with varied social and cultural backgrounds and inflow of cash at the same time may lead to anti-social activities such as use of more alcohol, gambling, and prostitution that may invite conflict between local and outsiders. A local committee representing local political parties will be formed which will be encouraged to impose restrictions on certain activities in the social places so that the workers do not become a nuisance to local people. Regular surveillance by security people will also be managed. To develop good relationship and understandings between local community and the project people and to maintain a harmonious relationship between them a public relation officer will be employed.

The execution of sub-project activities will not disturb archaeological and/or religious sites of the area.

Though there is no settlement area near the landfill site within one to two kilometer periphery, but the settlement nearby use the access road common to landfill site leading to their residence. The local people may oppose and hinder in transportation of waste to the landfill site raising issues of bad smell and littering of waste to their locality creating unhygienic condition. This could lead in risk of disturbances by the local people in transportation of wastes to the Sanitary Landfill site. The project will ensure that all the waste carrying vehicles are properly covered and no littering of waste occurs while transportation. The access road leading to landfill site will be well maintained.

The workers may be exposed to high noise levels during unloading and compaction of the solid waste. They may be exposed to high levels of dust during new cell construction, plying of wastes transportation vehicles, unloading and covering the cells. The gas emissions generated may affect health of the workers. Workers will be provided with safety equipment and safety procedures will be implemented as far as possible. Routine medical exams for workers will be carried out. The area being sensitive, entry of unauthorized person will be restricted. As per the demand of the local people, a health care center for workers and neighborhood has been provisioned in the detailed design.

7. Alternative Analysis

Within the outlined scope of work, various alternatives for implementation of the proposal were analyzed pertaining to environmental impacts of the project activities. The alternative analysis mainly focuses on project site; project design, technology selection and operation; and no project options.

8. Environment Management Plan

The Environmental Management Plan (EMP) delineates key issues likely to arise from Project implementation, and proposes mitigation measures, including monitoring schedule and responsibility. The EMP also outlines environmental management roles and responsibilities, sub-project design and construction management of different activities, site supervision, monitoring and reporting, records, and corrective measures, improvement proposals, and cost estimates for mitigation measures.

For urban projects, Ministry of Urban Development (MoUD) is legally responsible for project management and monitoring works. The PIU, STIUEIP-Birgunj will carry out the management/monitoring of the implementation of the EMP by the Contractor through its Design and Supervision Consultant.

PIU, STIUEIP-Birgunj will co-ordinate with DUDBC/PCO and get the technical assistance required for the implementation of the environmental protection measures. PIU, STIUEIP-Birgunj may also seek additional technical assistance from the Ministry of Forests and Soil Conservation and the Ministry of Science, Technology and Environment as and when necessary. PIU staff will work alongside the construction and operation to ensure that the measures and requirements outlined in the EMP are carried out effectively.

The six main parties responsible for the design and implementation of mitigation measures prior to, during and following sub-project implementation are:

- Ministry of Urban Development (MoUD)

- DUDBC/ PCO STIUEIP
- PIU, STIUEIP-Birgunj
- Asian Development Bank (ADB)
- Design and Supervision Consultant
- Construction Contractor

Similarly roles and responsibilities of other local, district and central level institutions and those affected by the project construction will also be equally important and the project proponent will maintain interaction and coordination with all of them accordingly. The other institutions are as follows:

- Ministry of Science, Technology and Environment (MoSTE)
- District Forest Office
- Municipality / DDC

MoSTE is responsible for final approval of the EIA report as per the provisions of Act and Rules and issue environmental clearance. Further it will carry out Environmental Audit of the project after two years of project operation.

Most of the mitigation costs are included as in-built in design and estimate. However, mitigation cost not included in in-built design and estimated separately to be included as part of the contractor's bill of quantity is specified in the EMP. The total estimated environmental cost is NRs. 11,226,270. The percentage of environmental cost to the project cost is around 2.34%.

9. Conclusion

Conclusion

There is no environmentally sensitive area near to the proposed site. Since there is no settlement nearby, nuisance to neighboring area due to foul order and influx of insects, rodents and public health hazard from odor, and disease transmitted by flies, insects, bird and rats will be insignificant.

Surface and ground water pollution from leachate is less likely because the land presently is used for flooded paddy indicating very low infiltration and the design includes leachate collection and treatment facility with placement of HDPE sheet liner and clay liner system at the bottom as well as along the vertical slope of waste storage dam to prevent leachate contaminating the ground and surface water. Methane and other gases will be generated as the waste degrades within the landfill mass. Gas collection facilities consists of collection wells and a flaring station depending upon the characteristics of the deposited waste after composting and other waste recovery and processing activities.

The identified and predicted impacts have been evaluated to know their significance. A number of benefit augmentation measures and adverse impacts mitigation measures have been proposed to offset the adverse environmental impacts, and make the project environment-friendly. The mitigation measures will minimize the impacts sufficiently.

Recommendation

The project will be implemented with strict adherence to the mitigation measures as prescribed in the Environmental Management Plan which is designed to form part of the Bidding Document so that the contractor's are compelled to implement them. The proposed environmental enhancement measures will help upgrade the quality of life of the affected

people. Training and employment during construction will be crucial in enhancing livelihood of affected locals.

Taking into consideration the nature of the project, its location, evaluated environmental impacts and practical mitigation measures, including existing policies and laws on solid waste management and resource mobilization, and the environment, this project could be recommended for implementation. However, it is to be noted that proposed site is meant for the disposal of the municipal wastes only and hazardous waste shall not be entertained in the landfill site.

Table of Contents

LIST OF TABLES

LIST OF FIGURES

ANNEXES

Abbreviations / Acronyms

amsl	Above Mean Sea Level
BSMC	Birgunj Sub-Metropolitan City
CITES	Convention on International Trade for Endangered Species
DDC	District Development Committee
DLP	Defects Liability Period
DSC	Design and Supervision Consultant
DUDBC	Department of Urban Development and Building Construction
EA	Executing Agency
EIA	Environment Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Act
EPR	Environmental Protection Rules
GoN	Government of Nepal
IA	Implementing Agency
IEE	Initial Environmental Examination
km	Kilometer
m	Meter
m^2	Square Meter
m^3	Cubic Meter
MoSTE	Ministry of Science, Technology and Environment
MoUD	Ministry of Urban Development
NGO	Non Government Organization
PAPs	Project Affected Peoples
PCO	Project Coordination Office
PIU	Project Implementation Unit
PMSC	Project Management and Support Consultant
PWD	Public Works Directives
STIUEIP	Secondary Towns Integrated Urban Environment Improvement Project
SLF	Sanitary Landfill
SWM	Solid Waste Management
ToR	Terms of Reference
VDC	Village Development Committee

1. INTRODUCTION

1.1 Background

The Department of Urban Development and Building Construction (DUDBC), under the Ministry of Urban Development (MoUD), through the Government of Nepal, has received Loan 2650-NEP: Secondary Towns Integrated Urban Environmental Improvement Project (STIUEIP or the Project), from the Asian Development Bank (ADB). MoUD is the executing agency for the Project, working through DUDBC, and Birgunj municipality is the implementing agencies (IAs).

The Project will implement urban environmental improvement on an integrated basis including sewerage and drainage, solid waste and urban roads and lanes in the Birgunj municipality. It will also include:

- community development programs such as awareness-raising on health and hygiene;
- 3R (reduce, reuse, and recycle);
- investment in small-scale community facilities in the municipalities; and
- capacity strengthening of the municipalities and central government in the field of project management and operation.

The Project will be implemented over a five year period supported by the Asian Development Bank (ADB) through project loans. The EIA study covers the Solid Waste Management component of the subproject with development of Sanitary Landfill at Ward 7 and 9 of Itiyahi and Bishrampur VDC respectively of Bara District for Birgunj Sub-metropolitan City.

Birgunj Sub-Metropolitan City is Nepal's principal trade centre. The city has experienced rapid growth especially in the past decade, due to migration to the city from peripheral districts and VDCs for security reasons, or other reasons such as for a better livelihood. There is consequently environmental deterioration resulting from inadequate sanitation and drainage, and mounting traffic congestion mainly in the main road leading to poor air quality in the city. The individual institutional efforts of both the sub-metropolis and sectoral agencies in addressing these issues, has remained uncoordinated and grossly inadequate. Most of the fertile agricultural fields are rapidly converting into residential and commercial areas. The eastern part of the sub-metropolis which lies in the flood-prone area of the Singaha River is also being changed to residential and commercial areas due to pressure of an increase in the population in the sub-metropolitan city. Most buildings are being constructed in Wards 18 and 19. The infrastructural facilities such as solid waste, roads, sewer and storm-water drains and water supply, need to be developed to match the current rate of other development, which remains a major future concern.

Birgunj Sub-metropolitan City, PIU, STIUEIP as project proponent has engaged the Design and Supervision Consultant to undertake Detailed Engineering Survey, Design and Construction Supervision for improvement/development of Sanitary Landfill with infrastructural facilities for management of solid waste for Birgunj City including Environmental Impact Assessment, preparation of contract document for execution of the construction work.

1.2 Rationality for Conducting EIA

As per EPR 1997 and its subsequent amendments, EIA is mandatory for the proposed development of Sanitary Landfill as per clause details presented in Table 1.1.

Table 1.1: Environmental Study Requirements

Project Component	Study Requirement	EPR Clause No.	EPR Clause Statement
Solid Waste Management	EIA	Schedule 1, I1(a) Schedule 1, I1 (c)	• Requires IEE for land filling of waste ranging between 1000 – 5000 tons per year whereas EIA for greater than 5000 tons per year. • Requires IEE for land filling covering area between 5 to 10 ha.

The proposed sanitary land filling process at proposed sanitary landfill in 10.76 ha land at privately owned paddy land already acquired by the Municipality at Itiyahi and Bishrampur VDC of Bara District for Birgunj Municipality exceeds the required threshold value as the solid waste generation is estimated at around 12,228 tons per year at year 2016 and total solid waste of 254,312 tons will be filled in the land fill cells area of 4.92 ha during its 15 years life span i.e. year 2030 (DSC design report). Thus it exceeds the threshold value for rate of land filling as well as landfilling area requiring EIA study.

Subsequently the EPR empowers the Ministry of Science, Technology and Environment (MoSTE) to approve the EIA report. This EIA report has been prepared in accordance with the requirements of the EPR Clause 7, 10 and Schedule 1, 2, 4, and 6.

1.3 Objectives of EIA Study

The primary objective of the EIA is to assess and inform decision makers about the potential environmental impacts of the proposed project and to suggest appropriate and pragmatic mitigation measures to mitigate and / or minimize the adverse impacts so that the Project can be implemented in an environment friendly manner.

The specific objective of the EIA are:

- to document important physical, biological, socio-economic and cultural baseline conditions of the subproject area;
- to identify, predict and assess the adverse and beneficial environmental impacts of the project in terms of magnitude, extent and duration during the project construction and operation phases;
- to suggest mitigation measures for the adverse impacts and enhancement measures for beneficial impacts;
- to familiarize various stakeholders with EIA outcomes through public consultation and participation programs and to incorporate their relevant concerns and issues in EIA report;
- to prepare environmental management, monitoring and auditing plans; and

- to provide sufficient information to decision makers about likely consequences of the project due to its implementation to make the final decision for the approval of the project.

1.4 The Project Proponent

Project Implementation Agency

Birgunj Sub-Metropolitan City
Project Implementation Unit (PIU)
Secondary Towns Integrated Urban Environment Improvement Project (STIUEIP)
Birgunj, Parsa, Nepal
Telephone: +977 51532186
Facsimile: +977 51521220
E-mail: stiueip.birganj@gmail.com

Project Execution Agency

Ministry of Urban Development (MoUD)

Co-ordination, Monitoring and Implementation

The Project Coordination Office (PCO) in Department of Urban Development and Building Construction (DUDBC) is responsible for overall coordination, monitoring and implementation of STIUEIP assisted by the Project Management Support Consultants (PMSC).

1.5 Organization Responsible for Carrying out the Study

The EIA study for Improvement/Development of Sanitary Landfill for solid waste management component of Birgunj Sub-metropolitan City under Secondary Towns Integrated Urban Environment Improvement Project (STIUEIP) has been prepared by the proponent through its Design and Supervision Consultant (DSC) "SMEC International Pty Ltd., Australia in association with Brisbane City Enterprises Pty Ltd, Australia, CEMAT Consultants (P) Ltd., Nepal and Building Design Authority Nepal". The Ministry of Science, Technology and Environment (MoSTE) is the concerned authority for the approval of the Scoping, ToR and EIA study report.

1.6 Hospital Waste

It is to be noted that the proposed Sanitary Landfill Site is meant for the disposal of Municipal Wastes only and Hospital Wastes / Hazardous Wastes shall not be entertained in the Landfill Site.

2. Methodology

The overall procedure followed for this study is as briefed below which follows EPA and EPR 1997 and as amended (1999 & 2007). The EIA is prepared in compliance with other GON legislation, based on field studies and consultation with local people and officials of VDC, DDC, and Municipality.

2.1 Study Team

The EIA Study team comprised of following key professional from multi disciplinary field.

Name/Position in EIA Study Team	Qualification	Area(s) of study in EIA
Mr. Nagendra Jha / Team Leader DSC - STIUEIP - Birgunj	M.E. Civil Engineering / Sanitation B.E. Civil Engineering	Overall Design and Supervision Team Leader
Mr. Sarad Raj Shrestha / Environmental Specialist (EIA Study Team Leader)	M.Sc. in Environmental Engineering B.Sc. Civil Engineering	EIA Study and Report Preparation
Mr. Ricardo Mate Miranda / Solid Waste Management Specialist (International)	B.Sc. CE, B.Sc. SE, MSc. Public Health	Engineering Design of Sanitary Landfill Site
Mr. Ramesh Kaji Tuladhar / Solid Waste Engineer	M.Sc. in Civil Engineering	Engineering Design of Sanitary Landfill Site
Mr. Uttam Kumar Bajracharya / Social Development Specialist	M.A. Political Science (Social Science)	Socio-economic and Cultural Environment

2.2 Project Impact Area Delineation

The subproject impact area for the EIA study has been divided into two parts on the basis of proximity and magnitude of the impact. They are "core subproject area" and the "surrounding areas" likely to be affected by the construction and operation of the proposed project. The core sub-project area and surrounding areas are as defined below.

Core Sub-project Area

The core subproject area delineates area occupied by the project structures, facilities, waste collection and transportation areas as well as the area that will be impacted due to the construction and operation of the project and fenced off for safeguarding of various structures and facilities as well as the permanently acquired area by the project. The "core subproject area" includes areas occupied by the proposed Landfill site at Ward 7 and Ward 9 of Itiyahi and Bishrampur VDC respectively of Bara District and Birgunj Sub-metropolitan City area of Parsa District where collection and transportation of waste is carried out including area covering Ward 7 and Ward 9 of Itiyahi and Bishrampur VDC. These area is also defined as "Direct Impact Zone".

Surrounding Area

"Surrounding area" indicates a greater area, which will directly or indirectly be influenced by the implementation of the project. These area includes Boundary of Birgunj Sub-metropolitan area of Parsa District and Itiyahi and Bishrampur VDC of Bara District where no project structure and facilities are located. These area is also defined as "Indirect Impact Zone". The

administrative boundary of Birgunj sub-metropolitan area of parsa District covers 8 km North to South (Gandak canal to boarder area) and 4 km East to West (Singaha river to Sirsiya river).

2.3 Methods

2.3.1 Desk Study

All relevant literature, design reports, maps and other required information was collected and reviewed during desk study including available secondary data's of the project area. The environmental statutory legal provisions were also reviewed in addition to EIA manuals and guidelines, the EIA Scoping Document, approved ToR and Detailed Project Report which formed the basis for project study requirement both at desk level and field level. Published and unpublished literatures of the project area were collected from various sources and reviewed delineating coverage of the studies and data requirement during the field studies/visit to fulfill the gap in the EIA document. Approved ToR is presented in **Annex 1**.

Coordination was made with the design engineers about project location, design layout, project construction and operation modality aspects, and different activities in the project construction and operation. Various alternative options pertaining to design, technology, procedure of operation was also discussed for the selection of best alternatives.

This study guided for the development of checklists for depiction of data's and information on various environmental aspects during field survey and investigation so as to fulfil the TOR objectives. Detailed discussions were also held among the experts team on the field visit and methodology to obtain the required database for the evaluation of impact.

2.3.2 Field Study

A group of multidisciplinary team of experts comprising of DSC Team Leader, Environmental Specialist, Waste Management Specialist (international), Solid Waste Engineer (national), Ecologist and Social Development Specialist including Surveyors and Enumerators have been involved in the field study. The group collected existing baseline information about the project.

Information on physical, cultural, chemical, biological and social conditions of the project's direct and indirect impacts was collected. The information on different environmental components collected is as detailed below.

Physical Environment: Detailed field investigations along the proposed project components were done and baseline information was collected on physical environment. The checklist used for collection of physical environment is kept in **Annex 2.** Topographic features, land use, soil type were observed and recorded. Hydrological behaviours and drainage characteristics of the Singaha river and geological characteristics of the project area was documented.

Cultural Environment: Cultural, archaeological, historical and religious sites within the project area were observed by using checklists as presented in **Annex 2**. Direct observation methods were used for the study of cultural (i.e. temples, Manes, festival sites and cremation sites), historical and archaeological sites within the project affected areas. Information on the local culture was collected by focus group discussions (cultural practices, traditions, and its significance).

Chemical Environment: A sample checklist was used to collect the database on chemical environment which is presented in **Annex 2**. The data's were collected by direct observation for air and noise quality; direct observation and laboratory analysis for water quality on water sample collected from Singaha river at two location (U/S and D/S of Landfill site) and ground water from nearby tube well. The water Quality test results are kept in **Annex 8**. Besides, air, noise, water and solid waste information were also noted from discussions with local people.

Biological Environment: Survey and interviews were undertaken with the local people in the project area for the collection of information on flora and fauna of the project area using datasheet and questionnaires as given in **Annex 2**. The consultants and the local people discussed about possible impacts on the biological environment by the proposal and their mitigation measures.

Socio-economic Environment: The methods and tools used to collect the information on Socio-economic and Cultural Environment of the proposed project area is Focus Group Discussion (FGD). The practices of Focus Group Discussions were exercised in the affected VDCs. The participants for the group discussions were mainly local people residing near to proposed landfill site including farmers, workers, teachers, politicians, and businessman. Their attendance and issues raised/response is given in **Annex 3**.

The study did not require any survey for affected household as there do not exist any household within the project site. The nearby settlement is located far beyond 500 meters from the proposed site and the proposed landfill site area is owned by the Birgunj Municipality. The nearest settlement is Birgunj Ward 19 which is around 1.5 km west of the proposed site. The socio-economic data has been drawn from CBS 2011.

2.3.3 Impact Analysis

All the baseline information on environment of the project area and all the environmental parameters of the project were first assembled and examined using various methods and tools of the project activities in different steps of project development. The National EIA Guideline format was used and the impacts have been categorized as direct and indirect impacts. Each of the direct and indirect impacts has further been evaluated in terms of **Extent** (site specific, local and regional); **Duration** (short term, medium term and long term); and **Magnitude** (low, medium and high) based on conditions of the environmental parameter at present, estimated and projected damage of the project. But the magnitude of impacts as given in National EIA Guidelines has not been used as the system is not suitable to present the existing status and the reversibility of the overall impact.

2.3.4 Public Hearing

Public hearing/consultation meeting was conducted on December 21, 2013 (Paush 6, 2070) and presentation was made on findings of the EIA study to the stakeholders and gathered their opinions, suggestions and comments. A notice for the public hearing was published in the Kantipur Daily newspaper with the date of first publication December 11, 2013 (Mangsir 26, 2070) and posting of notice was made at each of the affected VDC offices, Municipality, DDC, schools, health posts and other public places to inform the local people. Notice for Public Hearing and Public Deed of Enquiry (Muchulka) of the notice is kept in **Annex 4**.

Around 60 local people were present in the meeting held at Shree Nepal Rastriya Madhyamik Vidhyalaya, Nagwa, Ward No. 19, Birgunj, Parsa. The detail of attendance of the participants in the public hearing is kept in **Annex 5**. A number of local area representative expressed their views and comments on the project. Comments and suggestions on the EIA report were received from the local people of the area. The public consultation deliberation,

suggestions and comments is summarized and given in **Annex 6** of this report. Recommendation letters received from the relevant stakeholders is kept in **Annex 7.**

2.3.5 Public Notice for Finalization of EIA Study Report

At the final stage of EIA Study, a **Public Notice** of 30 days duration was given in a national daily newspaper by Ministry of Science, Technology and Environment (MoSTE) requesting individual or institutional stakeholders to provide their comments on the EIA report. Copies of the EIA report was displayed at the project sites as well as at different public places including some relevant libraries.

2.3.6 Finalization of EIA Report

The final EIA report was prepared upon incorporating comments received from the relevant stakeholders and EIA review committee members present during final presentation of the EIA report on September 03, 2014 at MoSTE.

3. PROJECT DESCRIPTION

3.1 Project Location and Existing Solid Waste Management Practice

3.1.1 Project Location

The proposed Sanitary Landfill Site for Solid Waste Management of Birgunj Municipality lies in Itiyahi and Bishrampur VDC Ward No. 7 and 9 respectively of Bara District in Central Development Region of Nepal. The Singaha river located on the western boundary of the proposed sanitary landfill site touches Ward No. 19 of Birgunj Sub-metropolitan city. The proposed Sanitary Landfill site is linked with an existing gravel road from Ward No. 19 of Birgunj. The location of proposed solid waste management and landfill site is indicated in **Figure 3.1.**

The SWM component will adopt an integrated approach for solid waste management, with review and improvement of the entire system from segregation and collection, through 3R including focus on composting of organic waste, to transportation and final disposal at the sanitary landfill, and thus include procurement of necessary equipment and vehicles and the construction of a sanitary landfill site. Preliminary assessment has been made about the potential for utilizing the Clean Development Mechanism (CDM) for composting, and further studies will be undertaken during the detailed design stage.

3.1.2 Waste Generation Rates and Waste Volume Projections (Household, Commercial, Institutional, Street Sweepings)

The waste generation rate used in the detailed design is 0.35 kg/cap/day starting in 2011 as the base population year for planning. This figure is an average amount for the whole municipality and includes pre-collection recycling and composting from the waste stream. Population at 2011 of 135,904 was projected to year 2030 with base year 2016 as planning period. This average generation rate includes only the wastes arising from households, commercial and institutional establishments, and street sweepings. Health care waste data were not available during the detailed design stage. A separate study should be performed and a separate calculation performed when BSMC addresses the problem of health care waste management as ultimately this becomes a problem for BMSC. Industrial wastes are also not included in the design and are by law the responsibility of the waste generators themselves.

The bulk density of 0.320 kg/l or 320 kg/m^3 was used for projecting the trucked or collected volume of un-compacted wastes generated from Birgunj. However, the level of collection service was found to range only between 35% to 40% based on collection data obtained from the Sanitation Department for 3 months. Calculations of waste volumes were performed to estimate the indicative quantities of municipal solid waste that need to be collected and disposed of. These quantities are calculated from the point of generation. Waste collection data for 3 months by BMSC Sanitation department was compiled and analyzed to cross-check and verify the volume estimates at the points of collection by collection vehicles and at the point of disposal at the existing open dumps, temporary dumpsites and fill areas using municipal solid waste.

Figure 3.1 Location Map of Proposed Solid Waste Management & Landfill Site

Birgunj Sub-Metropolitan City
Parsa District

Parsa District
Bara District
SINGHA NADI
Birgunj Sub-Metropolitan City
Proposed Landfill Site
Bara District
Proposed Sanitary Landfill Site
LEGEND
Ward Boundary
Trunk Sewer
Branch Drain
Sub Branch Drain
Surface Drain
STP Site
Sanitary Landfill Site
Highway/ Bridge
Metalled Road/ Bridge
Gravelled Road/ Bridge
Earthen Road/ Bridge
River/ Stream
Canal
Contour
Spot Height

3.1.3 Waste Characterization and Composition

In Birgunj, the waste collection and sweeping services reach only about 30% to 40% of the municipality. There is no organized door-to-door collection system as yet, and 78% of the households still dispose of their waste in public places. Only 10.5% of households used fixed places or containers. From the community surveys, people view solid waste management as both their 1st and 2nd priority. The existing waste generation and composition obtained from official documents of Solid Waste Management Resource Management Center (SWMRMC) updated during the year 2011 is as follows:

Waste Composition	Percent by Wet Weight (%)
Organic	51.09
Inert	25.08
Metal	0.16
Paper	6.55
Glass	1.66
Plastic	10.14
Textile	4.65
Rubber	0
Others	6

Survey data from 2011 indicated a per-capita waste generation of 0.35 kg/cap/day as municipal average with a bulk of 0.323 kg/l for Birgunj Sub-metropolish (ADB TA 7355-NEP, Institutional Strengthening of Municipalities, Final Report). Therefore, for a projected population of 135,904 in 2011, the total municipal waste generation is estimated at 47.57 tonnes/day.

During detail survey and design, the Bulk Density of solid waste is assumed at 320 kg/m^3 and the total existing solid waste generation for Birgunj is estimated at 56.609 tons/day for design year 2016. With the proposed coverage of 60%, estimated solid waste generation for base year 2016 is estimated at 33.965 tons/day and the residual waste reaching landfill cells is estimated at 23.775 tons/day (12,228 tons/year) *[source detail design report]*. Thus the solid waste generation is estimated at around 12,228 tons per year at year 2016 and total solid waste of 254,312 tons will be filled in the landfill cells during its 15 years life span i.e. year 2030 (DSC design report). The census of 2011 officially establishes the population of all 19 wards at 135,904 with annual growth rate of 1.91%.

3.1.4 Existing Waste Collection Service

The Birgunj Municipality provides waste collection service in all 19 wards with two tippers and 8 tractors-trailers. The service is provided at two levels, one is the central-level service and other is ward-level service. At the central-level service, the Municipality controls the main routes namely: Road No. 1, Road No. 2 and Road No. 3 with two tippers and deploying 290 cleaning staffs for street sweeping. The existing collection routes are:

- Road No. 1: Bhandar Chowk, Rajat Jayanti Chowk/By-Pass Road junction, Masjid Road Chowk, Birta Mandir Chowk, Askhalia Chowk, Ghantaghar Chowk, National Trading Chowk, and Powerhouse.
- Road No. 2: Birta Mandir Chowk, Birta Bazar Chowk, Ganeshman Chowk, Loharpatti Chowk and Ghantaghar Chowk.
- Road No. 3: Ganeshman Singh Chowk, Reshamkothi Chowk and Link Road.

Ten open dump collection points in route no. 1, six collection points in route no. 2 and 6 collection points in route no. 3 are placed for temporary dumping of road side collected waste.

In the ward-level service, each ward office carries the cleaning work within ward boundaries upon their own management. The tractors are provided by Municipality in alternative days to collect and dispose the waste. In addition to routine alternative days, Municipality provides tractor upon call by ward particularly in the time of local festivities. In general 2 tippers do 10 trips per 2 shifts per day in core area whereas 8 tractors perform 16 to 20 trips daily in inner and outer core area. It is known to be operating private service under PPP program in ward no. 10, part of ward no. 15 and some cluster of ward no. 6 in Kumal Tole. The Municipality has supported them with rickshaw and manpower.

The total number of collection points identified is 37 in respective wards of the Birgunj Municipality which are as detailed below.

Ward No.	Collection Point and its Detail
1	There is no collection point in Ward No. 1.
2	CP No. 28, 29, 30 and 32. Two CP are located in Tribhuvan Highway and in front of Shree Ram hall. One at entry point of Doctor's colony and another in Ghusukpur Main road/railway line.
3	CP No. 33 and 4. CP 33 is located in front of Aadalat Quarter building opposite roadside of Udyogh Banijya Sangh and CP4 is located beside footpath of Narayani Hospital Chowk.
4	CP No. 5 located at intersection of Birta Bazaar Chowk towards Birta Link road.
5	CP No. 27 and 34. These are located in front of Kawadi gate between Kanya School and Ganesh Man Chowk.
6	CP No. 6 is located in Ganesh Man Chowk and is common service point of three wards naming 4,5 and 6. Most of the settlements of these wards are not accessible by large vehicles, tractor and tipper. So waste is collected by hand cart in inner area and brings waste to collection point where tractor comes.
7	CP No. 7, 26, 8 and 37. CP 37 is located in Chirinjibi Mill Chowk Road No. 3 which is boundary of all four wards (9,6,7 and 11). CP 7 is located at boundaries of wards 7 (north) and 6 (south) demarcated by Drainage Canal and CP 8 in road no. 2 opposite college and secondary school compound. CP 26 is located as shown in the map.
8	CP No. 9, 32 and 35. CP 9 is located beside culvert between Kailas road and Jame Masjid, CP 32 in front of Himalayan Bank and CP 35 located in Maisthan temple in Road No. 2.
9	CP No. 16 is located near poverty cluster in railway road.
10	CP No. 13, 14 and 15. These are located in Maanhbeshpu Mandir area and in cow yard area near Birgunj Ratri Madhyamic school.
11	CP No. 36, 12 and 11. CP 12 is located beside the wall of Telecom office, CP 11 at junction of vegetable market where market building stall is under construction, and CP 36 is located in road no. 3 at Gahawa Tole.
12	CP No. 17 (private) and 19. CP 19 is located near CDO office and School junction area. CP 17 is located beside the gate of Gopal Mandali (Marwadi Sewa Atithi Sadan).
13	CP No. 10 and 18. CP 10 is located in Ghdiharwa tole in front of Narayani Boarding School and Kumari Chowk. CP 18 is located beside wall of pond and sport council office.
14	CP No. 20 and 21. CP 20 is located near Agriculture Research Centre office and CP 21 opposite of school gate in Shreepur where sewer manhole exists.
15	CP No. 2, 3 and 1. CP 1 located at north of Suresh Oil, CP 2 nearby department of medicine management and CP 3 near Murli Chowk.
16	CP No. 22 which is located at centre of highway in Trimurti Cinema Hall Chowk.
17	CP No. 24 and 23. CP 24 is located beside shallow well in Thulo Pipra road where handcart used to park after daily work and CP 23 is locaed opposite of Sugar Mill in Sano Pipra. The Sugar Mill was closed down since 10 years ago and the land is occupied by Armed Police Force office.
18	CP No. 25 is located in Laxmanwa Gaon.
19	No collection point in Ward No. 19.

3.1.5 Temporary Disposal Sites

There are altogether six temporary dumpsites identified. However, there are unknown sites that exist in several other unreported areas in the Municipality. There are no permanent dumpsites under control of Municipality. All the identified areas are lowland areas owned by private parties and river banks.

- Murli Pond Dumpsite: The pond area is located in Ward No. 15. The dump site have been used since 10 days as of February 14, 2013. It is reported that the community has requested the Municipality to raise the lowland area to the level of road. Waste from Ward No. 17, 15, 16,10, and 18 (some part) is being disposed off here.
- Adalat Disposal Site: This site previously being used as dumpsite is located close to the bridge bordering with Ramgadwa VDC and Municipality Ward No. 6. The site has been used despite oppose from neighborhood. Sirsiya river separates the VDC and Municipality area.
- Custom Office Dumpsite: The site is located near Custom office in Ward No. 19 at Inaruwa. One is at side of Tribhuvan Highway and another at south where Kedia Eye Hospital building is being built.
- Sirsiya Dumpsite: The site is along Sirsiya river bank beginning from Pashupatinagar to the bridge that links to India Rakswol border. This is the major dumping site being used by the Municipality. The local is now opposing the act of dumping now.
- Ranighat Dumpsite: The site is located in Nayabasti at the bank of sirsiya river in Ward No. 13. It is reported that Municipal tractors or tippers bring nearly 2 trips of waste from Ward No. 13, 12 and part of Ward No. 14 to dispose in this site.
- Pond Dumpsite: The site is located at turning point from main road to Thulo Pipra. The land is known to be a pond below road level.

3.1.6 Private Contract Arrangement on Solid Waste Management

Under the support of PPPUE program of UNDP in Nepal, and as a new model for private sector involvement in rendering municipal services, Birgunj Sub-metropolis has recently (since September, 2011) contracted its SWM service in core areas of ward nos. 10 and 15 for a period of 5 years to a local NGO called "Sthaniya Agrasarta Bikash Sahayog Karyakram (LIDS)". The sub-metropolis sets its objective of extending SWM service with this concept in other wards too in near future, if it proves viable after close monitoring and evaluation of the private sector's performance.

3.1.7 Hospital Waste Management

There is no proper system of managing hospital waste in Birgunj Municipality. There are four big hospitals (Kedia Eye hospital, Narayani hospital, Maternity hospital and Krishna hospital) and many private clinics. The hospital wastes are getting mixed with municipal waste. It was noted that clinical waste is being dumped in collection point no. 4 located beside footpath of Narayani Hospital in Ward No. 3. In this site, waste comes from wards and two hospitals namely Kedial Eye hospital, Narayani hospital. All the hospitals has no own system of management of hospital waste. Recently, it is learned that Narayani hospital is currently disposing their waste in custom office located in Ward No. 19 near to India border.

BIRGUNJ SUB METROPOLITAN CITY

Figure 3.2 : Indicative Map of Solid Waste Primary Collection Point.

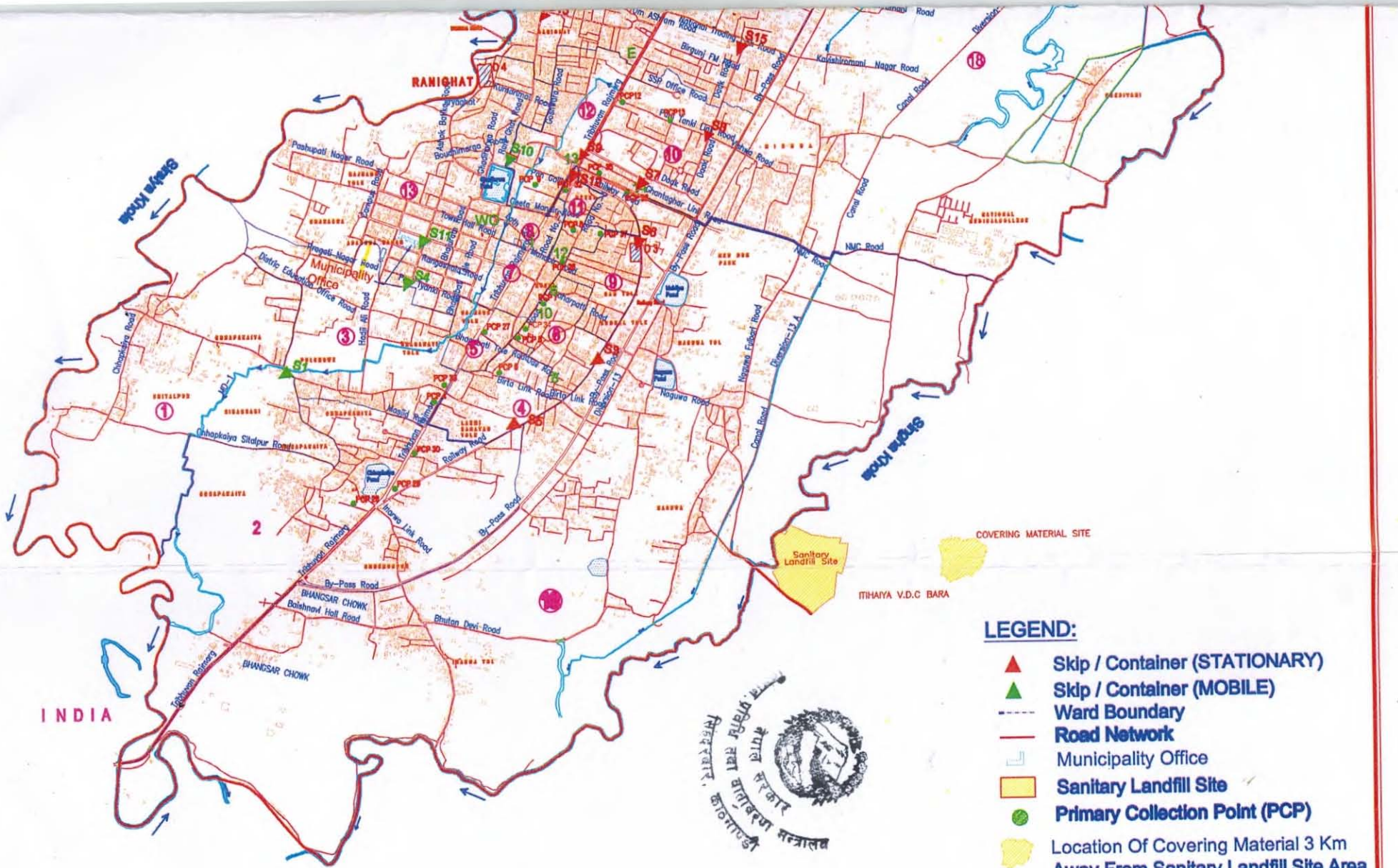
Table 2: Operational plan of Skip/container

S. N.	Skip Code no.	Place of skip ste	Ward no.	Skip type	capacity	Hoist truck	Frequency of collection (per week)	Disposal place
1	S 1	Hadji Ali road	3	Mobile	3 Cbm	V1 and V2	7 times	Landfil
2	S 2	Bypass road	2	Stationary	3 Cbm		3 times	Landfil
3	S 3	Railway road & Loharpatti junction	6	Stationary			3 times	Landfil
4	S 4	Panitanki Road	3	Mobile	3 Cbm		7 times	Landfil
5	S 5	Railway Road	4	Stationary	3 Cbm		3 times	Landfil
6	S 6	Railway Road	9	Stationary	3 Cbm		3 times	Landfil
7	S 7	Military barrack	10	Stationary	3 Cbm		3 times	Landfil
8	S 8	Daak road & Panitanki Link Road	15	Stationary	3 Cbm		3 times	Landfil
9	S 9	Sabji Mandi	12	Stationary	3 Cbm		3 times	Landfil
10	S 10	Ghadiarwa pond	12	Mobile	3 Cbm		7 times	Landfil
11	S 11	Statue Nagarpalika office	13	Mobile	3 Cbm		7 times	Landfil
12	S 12	Vegetable market near Telecom. office	11	Stationary	3 Cbm		3 times	Landfil
13	S 13	Agriculture office	14	Stationary	3 Cbm		3 times	Landfil
14	S 14	Shreepur road	14	Stationary	3 Cbm		3 times	Landfil
15	S 15	Brahmasthan National Trading Road	15	Stationary	3 Cbm		3 times	Landfil
16	S 16	Murli village	15	Stationary	3 Cbm		3 times	Landfil
17	S 17	Radhemai and Padma road junction	16	Stationary	3 Cbm		3 times	Landfil
18	S 18	Thulo pipara village	17	Stationary	3 Cbm		3 times	Landfil
19	S 19	Reserve	Nagarpalika office	-	3 Cbm		-	-
20	S 20	Reserve		-	3 Cbm		-	-
21	S 21	Reserve		-	3 Cbm		-	-

Note: - S: Skip/container and V1 & V2: Hoist Truck for lifting of skip/container

S: 18 Nos. (Supplied By NGO/ IRDC)

V2: Will Be Supplied By NGO/IRDC



LEGEND:

- Skip / Container (STATIONARY)
- Skip / Container (MOBILE)
- Ward Boundary
- Road Network
- Municipality Office
- Sanitary Landfill Site
- Primary Collection Point (PCP)
- Location Of Covering Material 3 Km Away From Sanitary Landfill Site Area

Secondary Town Integrated Urban Environmental Improvement Project (STIUEIP) Birgunj Sub-Metropolitan City , Nepal

Design and Supervision Consultant :

SMEC In Association with BDA CEMAT

Title:

INDICATIVE MAP OF SOLID WASTE PRIMARY COLLECTION POINT

Drawn By : R. Shrestha
Designed By : R. Tuladhar
Checked By : N. Jha
Approved By :

250 0 500 750m

Scale 1:25000

Date : – July 2013
Drawing No. 31
Sheet No. 3 of 4

3.1.8 Organizational Structure and Staffing

In the municipal organizational structure, staffing of sections and even of sub-sections with respective job descriptions remains mostly unclear. According to the current municipal organizational chart, two units (i.e. Solid Waste Collection Sub-section and Solid Waste Disposal Sub-section) are directly responsible for total solid waste management in the Sub-metropolis. These sub-sections are organized under "Sanitation Section" of the "Environment and Sanitation Division".

Equipment / vehicles possessed by the Sub-metropolis for regular Solid Waste collection and disposal service and other sanitation / construction works includes Handcardts (40 nos.), Tricycle (14 nos.), Tractor trailer (14 nos., 3m^3 capacity), Tractor trailer (14 nos., 4 m^3 capacity), Tipper (6 m^3 capacity), Back hoe loader (1 no.) and Suction Tanker (2 nos., 3 m^3 cap). Among these all are in operating condition except for one Suction tanker though in high demand.

3.1.9 Financial Aspect

Annual expenditure of the Sub-metropolis in solid waste management service in the last fiscal year 2010/11 was reported to be 57.75 million NPR, and the expenditure in the current fiscal year is projected at 59.02 million NPR (2.2% higher compared to the last fiscal year). This expenditure seems to be very high for the coverage and quality of the service being provided. Expenditure analysis of the last fiscal year shows that 65.2% of the total amount is expended in salary, 23.8% in allowances and other benefits, 6.2% in fuel and lubricants, 6.2% in repair & maintenance of equipment/vehicles, 1.3% in clothes/dresses for sweepers, and 0.9% in purchasing small equipment and tools (e.g. brooms, shovels, disinfecting materials etc.). It is however to be noted that there has been negligible revenue collection from the SWM service rendered by the Sub-metropolis, except that from septic tanks cleaning service.

3.2 Proposed Integrated Solid Waste Management System

The proposed Solid Waste Management (SWM) system is based on the integrated solid waste management principle including the 3 Rs (Reduce, Recycle and Re-use) that covers not only the final disposal facility at the sanitary landfill site but the equally important aspects of waste minimization and reduction at the source, segregation and separation for waste recovery, storage, transfer, segregated collection, recycling, composting, waste processing and final residual waste disposal. The system design is for the households and the wards to be involved in all the management aspects of the solid waste stream. All elements will be acting as a coordinated and integrated whole with the aim of preventing and mitigating environmental pollution, causing minimum environmental impact and protecting public health. The system design is for a planning period of 15 years.

Massive awareness campaign and training will be launched for the development of waste minimization and reduction efforts for household as well as for the wards. The key to its success is the commitment of the Birgunj Sub-Metropolitan City leadership to good governance and exercising the political will to enforce the newly revitalized Solid Waste Management Act. The NGOs and the social mobilizers of the project such as the "Tole" organization will also play a vital role in the success of the integrated system.

3.2.1 Waste Segregation, Storage and Volume Reduction at Source

The concept of volume reduction at the source shall be the first priority to be promoted by the solid waste management organization that is proposed to be established in the wards of Birgunj. Under the leadership of the City, all wards shall embark on a massive community awareness campaign (information, education and communication) and actively promote the reduction, recycling and reuse (3Rs) and minimization of wastes generated at the source. Responsibility for sorting and segregation of biodegradable and non-biodegradable wastes shall be at the household level, business, commercial, industrial and institutional centers, and in all other point source of solid wastes.

3.2.2 Waste Collection, Transport and Disposal at Sanitary Landfill

The objective is to organize and prepare a schedule that will collect, transport and dispose solid waste at Sanitary Landfill. Waste collection point has been established at designated locations (improved existing 32 collection points) and transport routes established to increase the present collection service of the fleet of vehicles and trailers and target a collection service of 60%. The assessment of road conditions and coordinating new routes with municipality will be a priority activity to increase collection service.

The collection efforts will be coordinated with the ward leaders, the households and the NGOs who are working on the 3Rs as this would decrease their load and increase their efficiency. The concerted efforts are targeted to minimize waste generation and reduce waste at the source or at the points of generation.

Wards shall be made organized to be responsible for the collection, segregation, recycling of biodegradable, recyclable, compostable and reusable wastes. The resulting residual wastes shall then be transferred to the waste resource processing center for composting and recycling at the Sanitary Landfill Site. Referring to 3R concept, 30% of the collection service is the targeted waste diversion for the households to practice waste reduction at pre-collection stage. The households are encouraged to reduce their waste and handle by way of backyard composting and reuse or redemption of recyclables. This amount is allocated to the households for waste reduction by intended waste diversion. Success will be dependent on the cooperation of the households on this activity.

Vehicles used for collection and transport of solid wastes shall have appropriate compartments to facilitate efficient storing of sorted wastes while in transit. The waste compartment shall have a cover to ensure the secure containment of solid wastes while in transit.

The City's waste collection vehicles coming from different wards of Birgunj shall bring the segregated recyclable wastes into the waste resources processing centre in the Sanitary Landfill site. Further the recyclables will be sorted and biodegradable will be separated that will go for composting. The remaining waste will then be dumped in designated landfill cells in a sanitary manner with daily cover of waste, proper management of leachate and gas.

The following is recommended for the collection, transport and handling of solid waste system.

- All collectors and other personnel directly dealing with collection of solid waste shall be equipped with personal protective equipment and paraphernalia such as, but not limited to gloves, masks and safety boots, to protect them from hazards of handling solid wastes.
- The City or at the wards level shall provide necessary training to the collectors and personnel to ensure that the solid wastes are handled properly in accordance with the city's solid waste guidelines.
- Collection of solid waste shall be done in a manner that prevents damage to the container and spillage or scattering of solid waste within the collection vicinity.
- Collection equipment e.g. tractor trailers, trucks, etc. shall be maintained in good condition and kept clean to prevent the harboring of vectors and the creation of nuisances.
- The use of separate collection schedules and/or separate trucks or haulers shall be required for specific types of wastes. Otherwise, vehicles used for the collection and transport of solid wastes shall have appropriate compartments to facilitate efficient storing of sorted wastes while in transit. The waste compartment shall have a cover to ensure the secure containment of solid wastes while in transit.
- Vehicles shall be designed to consider road size, condition and capacity to ensure the safe and efficient collection and transport of solid wastes.
- For the purpose of identification, vehicles (tippers, tractor trailers, rickshaws and handcarts) shall bear the identification/body number, the name, and telephone number of the contractor/agency collecting solid waste.

3.2.3 Proposed Sanitary Landfill Site

The proposed subproject includes Solid Waste Resource Processing Facility and Sanitary Landfill to be developed on a 10.76 paddy land owned by the Birgunj Municipality at Itiyahi and Bishrampur VDC in Bara District, east of the Singaha River. The proposed SWM system includes waste collection from designated location and direct transportation to the sanitary landfill, construction / improvement of access road to the waste processing centre, development of buffer zone, landfill cells, administration facilities, composting facilities, receiving facilities, and parking areas, etc.

The sanitary landfill site consists of a complex of the following solid waste management functions:

- Waste reception, business office and clearance for entry into sanitary landfill site.
- Composting Centre for a 1-2 tonne pilot compost manufacturing facility.
- Waste resource processing center for managing recyclable waste for storage and linking the products after light processing with buyers, consolidators and junk shops.
- Landfill cells area for the deposition of residual wastes in a properly engineered manner.
- Workshops and service center for servicing of landfill equipments and washing/servicing of the collection vehicles and equipments.
- Leachate collection and treatment system for ensuring that the groundwater table is not contaminated by leachate.
- Waste stabilization ponds and Leachate treatment plant system for ensuring treatment of leachate as per Nepali effluent or stream standards prior to release into Singaha River.

3.2.4 Salient Feature of the proposed Sanitary Landfill Site

Table 3.1: Salient Features of Proposed Sub-project Component

A. General

1.	Project Name	:	Secondary Towns Integrated Urban Environment Improvement Project **(STIUEIP) - Birgunj**
2.	Sub-Project	:	**Sanitary Landfill (SLF) Development** for Solid Waste Management of Birgunj Sub-Metropolitan City
3.	Location	:	Ward No. 7 of Itiyahi and Ward No. 9 of Bishrampur VDC of Bara District. Collection and transportation of solid waste from Birgunj Sub-Metropolitan City (BMSC), Parsa District. The proposed SLF is around 3km south east from the Birgunj core area (Ghantaghar).
4.	Nearest Settlement from proposed SLF	:	Mushharwa in Bishrampur VDC around 2 km East of SLF; Itiyahi settlement around 2 km North-East of SLF; and Nagwa Ward No. 19 of Birgunj Municipality around 1 km West of SLF.
5.	Accessibility	:	SLF is linked with existing Gravel Road of around 1 km length from Nagwa, Birgunj Municipality.
6.	Total Area Covered by SLF	:	10.76 ha
7.	Coverage of Birgunj Municipality	:	8 km North to South (Gandak canal to boarder area) and 4 km East to West (Singaha river to Sirsiya river).
7.	Topography, Land Use and Ownership of SLF Site	:	Terai plain, paddy land with sparse vegetation owned by BMSC
8.	Total Life Span of SLF	:	15 years beginning from year 2016 to 2030
9.	Surface and Ground Water	:	Singaha river flows from North to South along the western edge of SLF which also forms boundary of Bara and Parsa District. 20 years flood level is measured at 79.486m. Ground water table at Western part of SLF varies between 4.25 to 3.75m below ground level whereas Eastern part possesses 2.50m below GL.

B. Solid Waste Generation and Landfill Cells

1.	Total existing Solid Waste Design Generation Rate	:	56.609 tons/day (estimated for base year 2016)
2.	Solid Waste Design Generation Rate with proposed coverage of 60%.	:	33.965 tons/day (estimated for base year 2016)
3.	Bulk Density Considered	:	320 kg/m^3 (Loose)
4.	Type of SLF	:	Anaerobic Sanitary Landfill System
5.	Landfill Cells Area	:	4.92 ha
6.	Estimated Residual Waste going to Landfill Cells	:	23.775 tons/day (12,228 tons/year). Estimated for base year 2016.
7.	Total Capacity of SLF Cells Area	:	254,312 tons of Residual Solid Waste including cover material.

8.	Land Filling Method	:	Area method of land filling extending up to around 18m height with 1:4 side slopes having earthen waste retaining dam at the toe of the fill all around landfill cells.

C. Leachate and Gas Management

1.	Bottom Liner System including over Embanked Waste Storage Dam	:	Composite of imported red clay layer and geomembrane (HDPE sheet liners).
2.	Leachate Collection	:	Blanket leachate collection and recovery layer (granular material covered with geotextile is designed to drain into a collection drain (perforated Pipe).
3.	Leachate Treatment	:	Biological process consisting of series of ponds i.e. Leachate will pass through anaerobic, facultative and maturation ponds prior disposal to river body.
4.	Leachate Management	:	Will be operational throughout post-closure period.
5.	Gas Management	:	Consists of collection wells and a flaring station. Flaring station will be operated throughout the post-closure period.

D. SLF Operational Plan

1.	Operational Procedure	:	Waste materials shall normally be deposited at the toe of the fill. For practical purposes, the working area has been set at 1.5m high cell lifts with 6 meter widths and 20 meter length for each working day after which daily cover of clayey material will be applied.
2.	Spreading and Laying of Solid Waste	:	Solid waste will be spread and compacted in layers with repeated passages of the landfill equipment to minimize voids within the cell and maximize compaction. The loose layer shall not exceed a depth approximately 0.60m before compaction.
3.	Drainage Management of SLF Cells	:	Surface water drainage benches have been laid out at vertical intervals on the side slopes up to the final landfill height. Berms have been provided on the top cap to divert water to collection ditches and down drains to transport water off the cap.
4.	Final Cover	:	The cover design is based on locally available vegetative/protective cover layer and a drainage layer overlying a low permeability infiltration barrier. At closure, the cover is planned for seeding as necessary to promote re-vegetation to minimize erosion and potential damage to the cap.

E. Associated Infrastructure

1.	Access Road	:	Approximate 2.0 km
2.	Bridge over Singaha River	:	12 m span
3.	Internal Access Road	:	1.585 km
4.	Office and Training Centre	:	177.412 m^2
5.	Waste Segregation and Composting Yard	:	Area: 2368.19 m^2 Consists of a receiving office area, material separation yard, two composting machines with hammermills or shredder, windrow compost piles and transfer sheds for aeration and maturation into compost.
6.	Staff Quarters	:	Not proposed

7.	Parking Area	:	511.054 m^2
8.	Workshop/Vehicle Wash and Maintenance Yard	:	395.214 m^2
9.	Weighbridge	:	56 m^2
10.	Boundary Protection	:	Chain link fence all around with main entrance iron gate. Total Length: 1375 m
11.	Guard House	:	35.716 m^2
12.	Buffer Strip	:	Tree Plantation covering 15 m strip all around the proposed site.
13.	Drainage System	:	1700 m
F. Total Costs			
1.	Total Estimated Project Cost	:	NRs. 479,992,077.27
2.	Environmental Mitigation Estimated Cost	:	NRs. 11,226,270.00
3.	Percentage of Environmental Cost to Project Cost	:	2.34%

The Layout Plan of the proposed sanitary landfill is presented in **Figure 3.3**. All the design drawings of the above features have been prepared and were used in the cost estimating and preparation of the detailed Bill of Quantities that form part of bidding document.

3.2.5 Institutional Arrangement, Awareness and Training

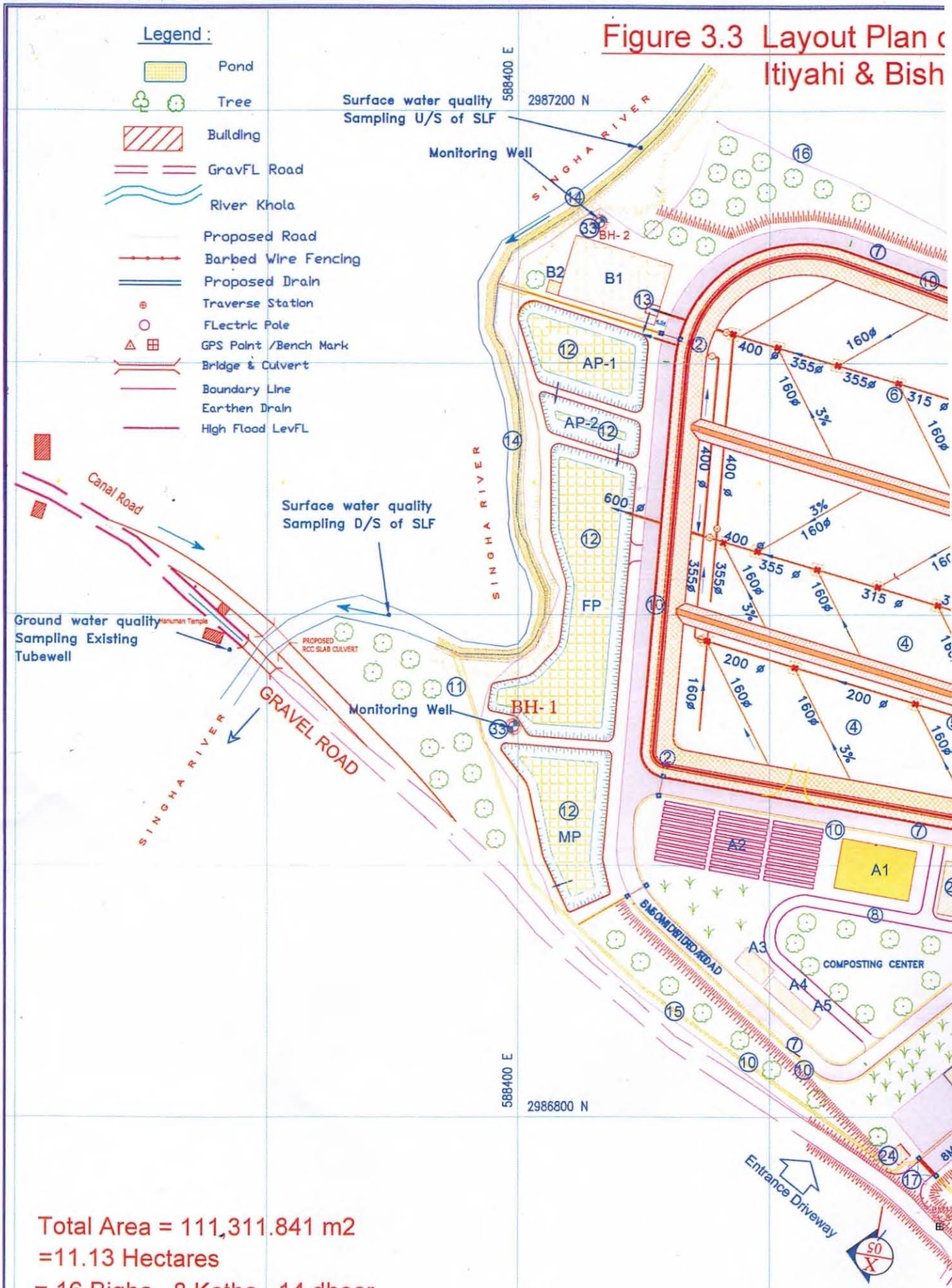
The existing organization of Birgunj Sub-Metropolitan City constituting sanitation department and environmental services division department should be rationalized for greater efficiency. The project awareness campaign has to be started right away and role of NGOs will be vital in the campaign. It is important for the present organization to work with the new organization running the landfill site. The two organization need to be attached to the Sanitation and Environmental Department of Birgunj in their present set-up. A Resident Manager is recommended to be assigned to the Sanitary Landfill Site.

During Defects Liability Period/One Year Operation Period, the Project Contractor will carry out operation and maintenance of the Sanitary Landfill with the cost to be borne by the Project. During this period, the nominated Resident Manager and other Municipal staff's will be trained by the Contractor for independent future operation and maintenance of Landfill site by the Municipality. Required key plant and equipments to be furnished by the Project to the Municipality under Project loan is as listed below. The ADB will support the Project till its defects liability period/one year operation period.

Required Key Plant and Equipment for Operation and Maintenance of Landfill including those to be Furnished by the Project to the Municipality

S.No.	Particular	Number	Condition	Remarks
1	Track Dozer	1	New	To be handed over to Municipality by the Project
2	Backhoe Loader	1	New	To be handed over to Municipality by the Project
3	Refuge Collector Hoist Truck (Skip Loader)	2	New	To be handed over to Municipality by the Project
4	Tractor with Trailer (capacity 3~4 m^3)	4	New	To be handed over to Municipality by the Project
5	Tipper Truck (capacity 6 m^3)	1	New	To be handed over to Municipality by the Project
6	Rickshaw / Tricycle (size 50"x33"x30")	4	New	To be handed over to Municipality by the Project
7	Rickshaw / Tricycle (size 39"x39"x16")	36	New	To be handed over to Municipality by the Project
8	Tipping Pedal Rickshaw	38	New	To be handed over to Municipality by the Project
9	Hand Cart (size 60"x36"x18")	25	New	To be handed over to Municipality by the Project
10	Hand Cart (size 48"x30"x18")	15	New	To be handed over to Municipality by the Project
11	Platform Weighing Scale (balance) (capacity 60 kg)	1	New	To be handed over to Municipality by the Project
12	Shredding Machine	2	New	To be handed over to Municipality by the Project
13	Solid Waste Skip Container	28	New	To be handed over to Municipality by the Project
14	Single Axle Weighing Bridge	1	New	To be handed over to Municipality by the Project
15	Portable Landfill Gas Monitoring Device	1	New	To be handed over to Municipality by the Project
16	Roller Compactor (8 Ton capacity)	1	Old	Owned at present by Municipality
17	Tipper Truck	1	Old	Owned at present by Municipality

Figure 3.3 Layout Plan o
Itiyahi & Bish

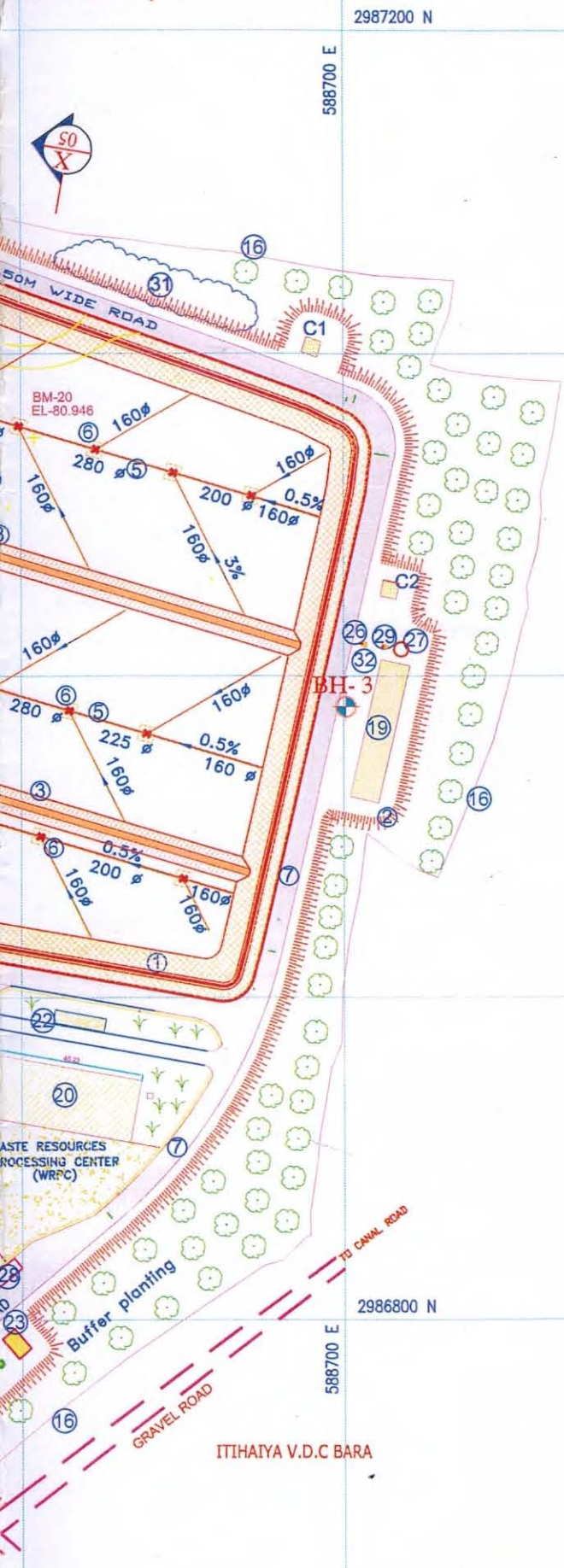


Total Area = 111,311.841 m2
=11.13 Hectares
= 16 Bigha , 8 Katha , 14 dhoor

Secondary Towns Integrated
Urban Environmental Improvement
Project (STIUEIP) Birgunj Sub-Metropolitan City , Nepal

Design & Supervision Consultant :
SMEC In Association with
BDA

oposed Sanitary Landfill Site
our VDC, Bara District



N

Legend :
Proposed Facilities

1. Main Earthern Bund
2. Storm Water Catchpit
3. Secondary Earthen Dam
4. Landfill Area(Phase–1,Phase–2 & Phase–3)
5. Leachate Collection Pipes
6. Gas Vent Pipe
7. Main Service Road (5.50m Width)
8. Interior Service Road (3.0m Width)
9. Parking Area
10. Storm Water Drain (Type I,II & III)
11. Outfall Drain
12. Anaerobic,Facultative & Maturation Pond
13. Leachate Outlet Chamber
14. River Training Works
15. Brick Masonary Compound Wall
16. Barbed Wire Fencing(Living Fence with Tree Plantation)
17. Main Entrance Gate
18. Administrative Building
19. Service Center and Workshop Office
20. Recyclable Waste Storage Building
21. Shed for Storage of Recyclable Waste Processing Center
22. Waste Processing and Recovery Building
23. Generator House
24. Guard House
25. Septic Tank and Soakpit
26. Tubewell
27. 5m3 HDPE Elevated Water Tank & Water Supply System
28. Triaxle Weighing Pad
29. Valve Chamber for Water Supply System
30. Electricity Layout Plan
31. Daily Cover Stockpile Area
32. Bore Hole Platform
33. Environment Monitoring Wells(BH–1,BH–2 & BH–3)

PROPOSED IN FUTURE

A. Composting Facility

A1. Composting Reception Area
A2. Windrow Compost Piles
A3. Compost Maturation Bins
A4. Post–harvest screening and packaging
A5. Final Compost Product Storage & Sales Office

B. Leachate Treatment Facility

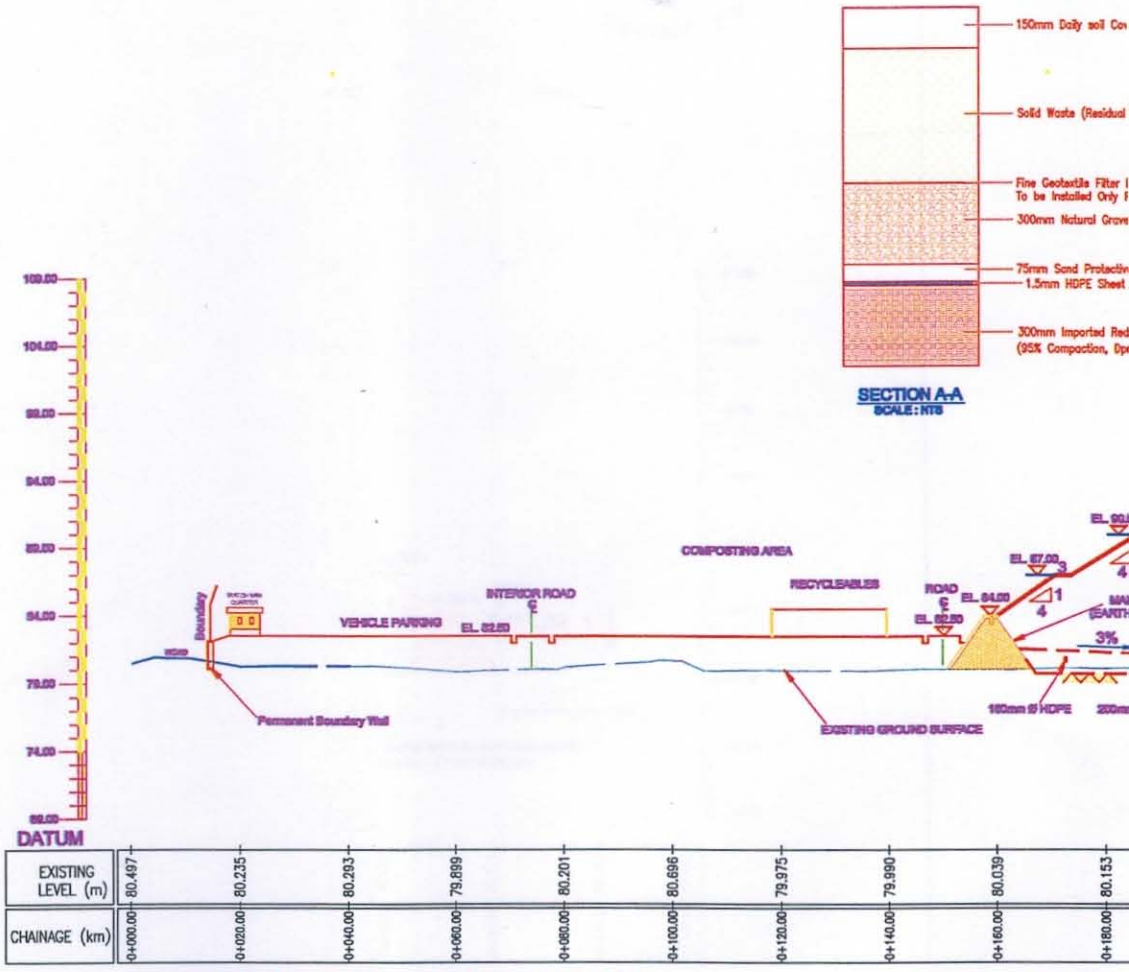
B1. Leachate Treatment Holding Tank(Future)
B2. Leachate Treatment Plant (Future)

C.Management Facilities

C1.Gas Management Facilities Future
C2. Fuel storage Structure (3000–5000 liters)

Title: Layout Plan of After Completion of SLF Operation INTEGRATED SOLID WASTE MANAGEMENT	Drawn By : G.P. Chaudhary Designed By : RM Miranda Checked By : N. Jha Approved By :	0 2.0 4.0 6.0m Scale 1:2000	Date : – July 2013 Drawing No. 4 Sheet No. 1 of 7

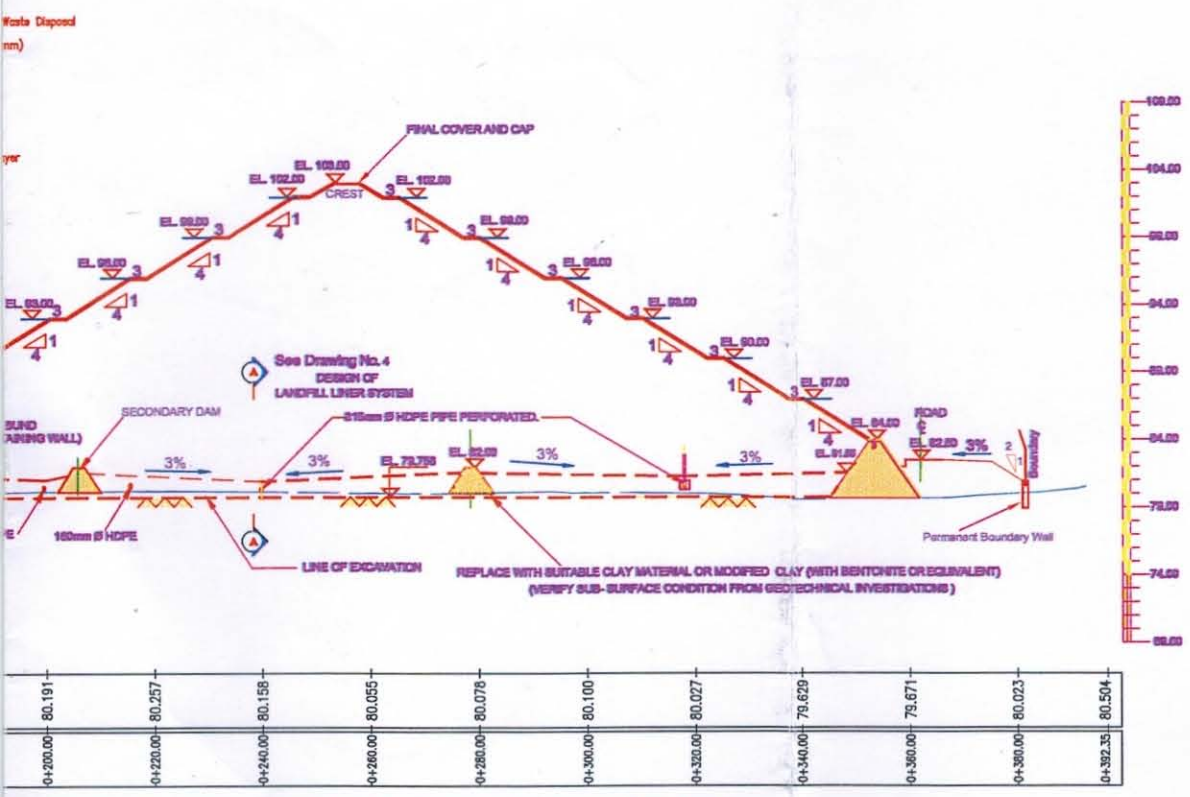
Figure 3.4 North - South Sec



CHAINAGE : 0+000.00 - 0+396.70

NORTH SOUTH

ɔnal Profile of the Proposed Landfill Site



ECTIONAL PROFILE OF SECTION X/05 -X/0 5

Title: **CROSS SECTION OF** After Completion of SLF Operation INTEGRATED SOLID WASTE MANAGEMENT	Drawn By : G.P. Chaudhary Designed By : RM Miranda Checked By : N. Jha Approved By :	0 5.0 10.0 15.0m Scale 1:500 (V) 0 2.50 5.0 10.0m Scale 1:2500 (H)	Date : – July 2013 Drawing No. 4 Sheet No. 2 of 7

3.3 Project Works and Materials to be Used

Mechanized methods for specialized works will be employed for project works, such as for landfill cells base excavation; excavation for anaerobic, facultative and maturation ponds; laying of clay liner and earthen waste storage dam, drainage material, leachate collecting drainage pipes; back filling works; production of sub-base and base course including spreading, compacting, and finishing with a bituminous seal. Labour - intensive methods shall be used for other works such as tree plantation and turfing that can be done manually, including small earthworks for building trenches, road side drain, construction of proposed buildings and minor retaining structures etc. Local people will be given priority for works according to their skill and qualification. The project works will include following major activities:

- Excavation for base layer preparation of landfill cells and trenches for proposed buildings and river training works.
- Excavation of different ponds and treatment units for leachate treatment.
- Construction of earthen dam for waste storage (laying and compaction of embankment fill).
- Laying of clay liner, HDPE sheet liner, drainage layer and installation of geo-textile fabric.
- Laying of leachate collection drainage pipes.
- Installation of weighbridge.
- Masonry and concreting works for building, drainage and pavement construction over compositing and vehicle maintenance, parking and wash area.
- Embankment fill for interior road construction works and site development.
- Sub-base and base laying for road works.
- Bituminous Pavement for road works.
- Construction of road side drains, cross-drainages (pipe & slab culverts), retaining walls etc.
- Installation of services i.e. electricity, telecommunication and water supply pipelines.
- Tree felling for site clearance, tree plantation for creation of buffer zone including turfing on embanked slopes of earthen dam for waste storage.
- Proper land filling on landfill cells, placement of cover material, cleaning and proper operation of plant and equipment, waste segregation and separation, composting and appropriate operation of leachate treatment plant during operation phase.

The major materials to be used in the project works are as detailed below.

Table 3.2: Summary of Estimated Quantities of Materials

Item Description	Unit	Quantity
Site clearance of grass, shrubs and excavation of loose material.	m^2	32,076
Earthwork in Excavation	m^3	48,374
Backfilling with compaction, watering in layer not more than 15cm	m^3	1,706
Formation of embankment for waste storage dam, road formation works and site development.	m^3	101,573
Laying filter layer (grain size 30-50mm)	m^3	12,173
Filling with fine sand for cushioning over 1.5 mm thick HDPE Geo-membrane	m^3	3,257
Supply and laying red clay liner	m^3	11,644
Laying 1.5mm thick HDPE Geo-membrane	m^2	55,975
Supply and laying Geo-textile (Filter Fabric)	m^2	35,480

Item Description	Unit	Quantity
Supply and laying perforated HDPE pipe of size ranging from 160mm to 400mm for leachate collection and management.	RM	1,749
Supply and laying non-perforated HDPE pipe for Sanitation works	RM	1,130
Supply and laying GI pipe for Water Supply works (15mm dia to 100mm dia)	RM	326
Concrete works of M20 grade	m^3	798
Concrete works of M15 grade	m^3	340
Concrete works of M10 grade	m^3	6
Placing Steel Rienforcement	Tonne	32
Laying RCC hume pipe of size 400, 600, and 900mm dia	RM	184
Brick Masonry for structures	m^3	1,353
Flat brick soling	m^2	4,466
Random rubble masonry (stone pitching)	m^3	1,008
Supply and laying Gabion works	m^3	1,101
Supply and laying sub-base for road works	m^3	1,356
Supply and laying graded crushed stone base	m^3	1,317
Supply and apply 80/100 grade bitumen with 10% cutback for tack coat	m^2	6,898
Installation of Asphalt Concrete on newly constructed road	m^3	351
Broadcasting of grass seeds on embanked slope	m^2	40,000
Cutting and Felling of Trees of girth size >0.30 – 0.60m	Nos.	633
Cutting and felling of Trees of girth size >0.60 – 0.90m	Nos.	92
Cutting and felling of Trees of girth size >0.90 – 1.80	Nos.	8
Plantation of Trees all around the landfill site for creation of buffer zone and road side plantation at access road @1:25	Nos.	15,825

Source: Preliminary Quantity Estimate

3.4 Manpower Requirements and Construction Method

The maximum numbers of workers required for the proposed project during the peak period of construction is estimated to be approximately 150 in numbers. Local people will be given priority for employment as per their skill, experience and qualification in the project during the construction phase. Similarly, around 20-25 permanent jobs will be created during the operation phase of the project.

The major components of works related to the project will require pre/post qualification of contractors in order to execute project works under single ICB Contract package for civil works and supply and installation of plant and equipment. The construction sequence has been planned in accordance to productivity rates of required equipments for the respective works. The construction will involve both machine and manpower.

3.5 Resources Required for the Implementation of the Proposal

The key equipments required for the smooth execution of the project works are as detailed below.

Table 3.3: Required Key Plant and Equipments

S. No.	Equipment Type and Characteristics	Estimated Number Required
1	Excavator (0.75 m^3)	4
2	Loader (1.5 m^3)	2
3	Grader (160 hp)	1
4	Tipper Trucks (8 m^3)	12
5	Vibratory Roller (1,800 km/m)	1
6	Pneumatic Tyre Roller (10-15 Ton)	1
7	Water Bowser	4
8	Bitumen Distributor (5000 litre)	1
9	Bitumen Decanter (5000 litre)	2
10	Chips Spreader	1
11	Crusher Plant	1
12	Screen Plant	1
13	Dozer (G7)	1
14	Concrete Mixture (1 bag capacity)	10
15	Hand Operated Compactor	.10
16	Water Pump	10
17	Generator	10
18	Compressor	2
19	Concrete Vibrator	10
20	Unique Crane	1

3.6 Total Cost of the Project

The total construction cost needed for the implementation of the sub-project is estimated to be around **NRs 479,992,077.27** (four hundred seventy nine million nine hundred ninety two thousand seventy seven and paisa twenty seven only) including VAT, 5% price contingency and 5% physical contingency (as per design estimate).

3.7 Work Schedule

The landfill site development work under STIUEIP will be implemented over 2 year's period upon work commencement with the provision of single ICB contract package. One year's defects liability period has been allocated for defects remedial works. The earth work activities of the Project shall be avoided during monsoon period. The construction activities will be carried out during day hours only.

3.8 Operation of Landfill

The operational plan enables the site preparation, landfill cell construction, soil cover, leachate treatment, gas management, record keeping activities, closure activities and environmental monitoring (during landfilling and post-closure) to be conducted in a safe, efficient, and environmentally sound manner.

Unloading of solid wastes shall be confined to a small area as possible to accommodate the number of vehicles using the area without resulting in traffic, personnel, or public safety

hazards. Waste materials shall normally be deposited at the toe of the fill. For practical purposes, the working area has been set at 1.5m high cell lifts with 6 meter widths and 20 meter length for each working day after which daily cover of clayey material will be applied.

Solid waste will be spread and compacted in layers with repeated passages of the landfill equipment to minimize voids within the cell and maximize compaction. The loose layer shall not exceed a depth approximately 0.60m before compaction. Spreading and compacting will be accomplished as rapidly as practicable. Covered surfaces of the disposal area shall be graded to promote lateral runoff of precipitation and to prevent ponding. Grades will be established of sufficient slopes to account for future settlement of the fill surface. Cover material or native material unsuitable for cover, stockpiled on the site for use or removal, will be placed so as not to cause problems or interfere with unloading, spreading, compacting, access, safety, drainage or other operations.

4. REVIEW OF POLICIES, PLANS, LAWS AND GUIDELINES

The existing policies, plans, laws, guidelines and institutions are summarized in this chapter in order to inform the decision makers and relevant stakeholders about their implications on the Project functioning. For easy reference, relevant provisions of constitution, policies and plans, laws, guidelines and institutional instruments to this Project have been summarized below:

4.1 Plan, Policies and Strategies

4.1.1 The Interim Constitution of Nepal 2063 (2007)

Article 16 (1) of the Interim Constitution of Nepal 2063 (2007) as proclaims that every person shall have the right to live in healthy environment. The Constitution also establishes the right of property as a fundamental right to citizens. Article 19(1) states that every citizen shall, subject to the laws in force, have the right to acquire, own, sell, dispose of and otherwise deal with property. Similarly, article 19(2) states that the state shall not, except in the public interest requisition or acquire, or otherwise create any encumbrance on the property of any person. Provided this clause shall not apply to any property earned in an illicit manner. Article 19(3) specifies that there shall be given compensation for any property requisitioned, acquired or encumbered by the state in the course of enforcing a scientific land reform program or in the public interest in accordance with law. The compensation, the basis thereof and the procedure therefore shall be as determined by law.

Article 12 (1, 2 & 3) of the Constitution of Nepal 2063 (2007) states that every person shall have the right to live with dignity, and no law which provides for capital punishment shall be made. Except as provided for by law no person shall be deprived of his/her personal liberty. Every citizen shall have the following freedoms: freedom of opinion and expression; freedom to assemble peaceably and without arms; freedom to form political party; freedom to form unions and associations; freedom to move and reside in any part of Nepal; and freedom to engage in any occupation or be engaged in employment, industry and trade.

4.1.2 Three Years Interim Plan, 2008

Under the Environment and Waste Management Section of Local Development of this plan, It states that "*Special effort will be made towards establishing a processing center for the management of biodegradable wastes in Municipalities and urbanizing VDCs of Nepal. Initiative will be made towards modifying and updating the National Policy, 1997 for waste management with the participation of concerned stakeholders. Hazardous wastes generated from the industries and hospitals, will be managed by the institutions concerned without health consequences resulting from management of such wastes. The municipalities and urbanizing VDCs, those geographically nearer and connected to transportation for easy accessibility, shall work jointly in community awareness building, management of landfill sites, organic fertilizer production and energy development. The waste Management and Resource Mobilization Center will facilitate this initiative. Efforts shall be made towards increasing private sector participation and promotion of public-private partnership in tasks relating to waste management such as, collection, storage, transport, sorting, recycling and processing of wastes.*" *The Concept Design of Sanitary Landfill Site for Birgunj has*

considered all the above aspects. But the application of these measures must be ensured by the government as well as municipalities who will have the responsibility of operation of the landfill site.

4.1.3 Environmental Policy and Plan

Government of Nepal, for the first time in the planning history of Nepal, integrated environmental aspects in the *Sixth Plan (1980-'85)* and urged to carry out EIA of development Projects and programmes (NPC, 1980). This commitment was re-enforced in the *Seventh Plan (1985-90)*, the *National Conservation Strategy, 1988,* and the *Master Plan for Forestry Sector (1989)*. The *Eighth Plan (1992-'97)* elaborated the need for institutionalizing EIA system to attain the goals of sustainable development by integrating environmental aspects into development activities (NPC, 1992). The Nepal Environmental Policy and Action Plan (1993) and Environmental Strategies and Policies for Industry, Forestry and Water Resource Sectors (1998) also recognized EIA as an essential planning and management tool to internalize environmental management activities into development Projects.

The Ninth Plan (1997-2002) emphasized on participatory EIA, involvement of the stakeholders in natural resource management and internalization of environmental management in sectoral development Projects and programs, with a view to attaining sustainable development objectives. *The Environment and Natural Resource Management Policy*, as included in the Ninth Plan, has re-emphasized the need for internalizing and institutionalizing the EIA system right from the local level through coordinated effort (NPC, 1997).

The Tenth Plan (2003-2007) has identified EIA as a priority area, and it emphasizes on environmental monitoring of the Project that have undergone EIA process. The Plan focuses on the need for setting-up national environmental standards with the strategy of internalizing environmental management into the development programmes. The Plan has also realized the need for carrying out Strategic Environmental Assessment (SEA) to promote environmental administration and governance. The plan emphasizes on the participation of the local people for environment conservation, according to the Local Self Governance Act 2055 (1999), through the local bodies, by making them responsible and capable to manage natural resources at the local level. The Local Self Governance Act, 2055 also empowers the local bodies for the Conservation of soil, forest and other natural resources and implement environment conservation activities.

During the last two and half decades, Government of Nepal has endorsed and implemented several sectoral policies and conservation-friendly documents which also focus on conducting environmental assessment. To name a few, the National Conservation Strategy (1988) and Master Plan for Forestry Sector (1989), Nepal Environment Policy and Action Plan (NEPAP I and II) (1993 and 1998) and Sustainable Development Agenda for Nepal (SDAN) (1993) provide a number of opportunities to internalize and institutionalize environmental assessment process in Nepal. SDAN emphasizes on the conservation of forests, species, ecosystems, genetic resources or in other words biodiversity.

4.1.4 Other Policies

In view of the location of this area there is no possible impact on forest. Thus forest policy is not attracted. Government of Nepal has endorsed Nepal Biodiversity Strategy (NBS) in August 2002 which emphasizes on carrying out EIA. The focus of the NBS is on the conservation, management, and sustainable use of biodiversity including equitable sharing of benefits arising out of the usage of biological resources (MFSC, 2002).

4.2 Relevant Laws

Nepal has a wide range of regulatory framework towards the protection of the environment and promotion of development activities. Article 16(1) of the Interim Constitution of Nepal 2063 (2007) as proclaims that every person shall have the right to live in a healthy environment.

A number of important measures have been already been adopted with the objective of integrating the environmental concerns into development programmes since UNCED. The Environmental Protection Act (EPA), 1996 and Environmental Protection Regulations (EPR), 1997 set the legal framework for the integration of environmental aspects into development projects and industrial investments.

4.2.1 Environmental Protection Act (EPA), 1996 and the Environment Protection Rules EPR), 1997

The Environment Protection Act (EPA), 1996 and the Environment Protection Rules (EPR), 1997 are the principal regulatory frameworks to make the development programs and Projects environment-friendly. The law entered into force since June 1997 contains several provisions to internalize environmental assessment system and to maintain a clean and healthy environment by minimizing the adverse impacts on human beings and other life forms and physical objects. Section 3 to 6 of the EPA, 1996 and Rules 3 to 11 of the EPR, 1997 contain provisions on the approval process of the IEE/EIA report. Rule 12 of the EPR oblige the Proponent to comply with matters mentioned in the report and other conditions, if any prescribed by the approval agency. As per the environmental law, the proponent is required to prepare EMAP for EIA study and should implement the environment enhancement and mitigation measures as per Environmental Management Action Plan (EMAP) proposed in IEE or EIA.

The EPA, 1997 obliges the proponent not to implement the proposals without approving IEE or EIA reports for the prescribed Projects (Section 4). Section 6 empowers the Ministry of Science, Technology and Environment (MoSTE) to approve the EIA report. Based on Schedule 2 of the EPR, 1997, this Project requires to complete the EIA process and to get the EIA report approved before its implementation. The EPR, 1997 provides detail provisions with regard to approval of the EIA report and responsibilities of the institutions during the Project implementation stages. MoSTE should approve the EIA report legally within 60 days of its receipt, in general, but no later than 90 days upon its receipt.

The environmental legislation is very clear with regard to environmental monitoring and auditing and EPR, 1997 empowers the concerned agency. In this case for environmental

monitoring at all phases of the Project and MoSTE for environmental auditing after two years of service start by the Project.

Major Highlights of Environment Protection Act, 1997 are as follows:

- Section 3: The proponent should carry out IEE/EIA of the prescribed proposals.
- Section 4: No one should implement the proposals requiring IEE or EIA without approval.
- Section 5: The proponent should submit the IEE/EIA reports for approval by the concerned agency for approval process.
- Section 6: Upon receipt of such proposal, the concerned agency should approve the IEE report and forward the EIA report to MoSTE for approval process. MoSTE should approve the EIA report after public notice is over. MoSTE can form a committee to seek suggestions over EIA reports.
- Section 17: If any person ask for compensation, the proponent is liable to compensate for the loss or effect as prescribed.
- Section 18: In case the proposal requiring environmental assessments is implemented without necessary approval or violates the conditions of approval, the prescribed authority may close down such activity immediately and may punish up to NRs. 100,000/.
- Section 19: A person who is not satisfied with the decision of the prescribed authority may appeal to the concerned Appellate Court within 35 days from the date of decision or order.
- Section 23: Government may frame and implement necessary guidelines, including EIA guidelines.
- Section 24: Government may frame necessary rules, including conduction of IEE or EIA, standards etc.

Major highlights of Environment Protection Rules, 1997 (amendment 5 April 1999) are as follows:

- Rule 3: The proponent is required to prepare IEE and EIA report as per Schedules 1 and 2 respectively.
- Rule 4: Before preparing an EIA report, the proponent should publish a 15 days public notice to provide the stakeholders to offer their opinions and concerns in writing on the proposal. The proponent should prepare and submit the scoping report to the concerned agency and forward to MoSTE for approval and MoSTE should determine the scope of the EIA study as submitted or amended.
- Rule 5: In case of IEE report, the proponent should prepare and submit the TOR and get approval of TOR from concerned agency while in case of EIA report, the proponent should prepare and submit the TOR to the concerned agency, which should forward to MoSTE for necessary approval.
- Rule 6: In case, the approving agency of IEE report finds appropriate to carry out EIA, the proponent should fulfill all the formalities of the EIA process.
- Rule 7: The proponent should prepare IEE and EIA report in the format as indicated in Schedule 5 and 6 of the EPR, 1997 respectively. In case of IEE report, the proponent should notice the concerned VDC, Municipality, DDC, school, health posts and hospital to offer their opinions and suggestions in writing before the finalization of the IEE report.

However, the proponent should conduct a public hearing in the project site about the EIA report.

- Rule 10: The proponent should submit 15 copies of the IEE/EIA report along with the recommendation of the concerned VDC or municipality to the concerned agency for approval.
- Rule 11: The concerned agency, after investigation, should approve the IEE report within 21 days from the date of its receipt, and forward the 10 copies of the EIA report with its suggestions to MoSTE within 21 days from the date of receipt. Upon receipt of the EIA report, MoSTE should issue a 30 days public notice in the daily newspaper to offer written comments of the stakeholders. MoSTE also may seek the suggestions of the committee, if formed for this purpose, and should approve the EIA report within 60 days from the date of receipt or within 90 days in case of special reason.
- Rule 12: the proponent should implement EIA and other conditions given during the approval process.
- Rule 13: The concerned agency (ministry) is made responsible for environmental monitoring and evaluation activities, and issue necessary directives to the proponent to implement environmental protection measures.
- Rule 14: MoSTE is responsible to prepare the environmental auditing report after two years of the commencement of the services by the proposal.
- Rule 45-47: Anyone wishing to receive compensation may file the application to the Chief District Officer (CDO) and should forward the file to the concerned agency in case the evaluation of effects/loss. Once the loss of evaluated, the CDO should determine the amount of compensation within 60 days of receipt of application. The proponent should pay the compensation amount within 30 days of decision. In case the proponent (individual, institution or proponent) fails to pay within the time limit, the victim may submit an application, and the CDO shall auction the property of the proponent and pay the amount of compensation as determined.

Ministry of Science, Technology and Environment (MoSTE) published an additional notice in the Nepal Gazette, on 23 August 1999, stating that the proposals which are not listed in Schedules 1 and worth of investment of over Rs. 10 million to 100 million may require IEE study, and those which are not listed in Schedule 2 and worth of investment of over Rs. 100 million should undergo an EIA process.

4.2.2 Solid Waste Management Act, 2068 (2011)

Solid Waste Management Act, 2011 recognizes the importance of solid waste management in maintaining a healthy environment. The act requires local body to take all the responsibility to construct and operate the infrastructure or structure required for the collection, final disposal and processing of solid waste, including construction of any transfer station, landfill site, processing plant, compost plant, and bio gas plant for the management of solid waste.

Section 4 of the Act assign the local body to manage or use otherwise the solid waste discharged or dumped in collection center, transfer station or treatment plant or collected during cleaning. As per Section 4, Sub-section 2 of the Act, the responsibility for processing and management of hazardous waste, medical waste, chemical waste or industrial waste

under the prescribed standards shall rest with the person or institution that has generated the solid waste.

According to Section 6, Sub-section 1, the local body shall have to prescribe for segregation of solid waste at source by dividing the solid waste into different categories including at least organic and inorganic. Similarly, as per Sub-section 2 of the Act, a person, institution or entity that produces solid waste shall require carrying them in the collection centre, Local body may provide necessary technology, goods, equipments, containers, etc. to them.

4.2.3 Solid Waste Management Rules, 2070 (2013)

The *Solid Waste Management Rules, 2070* was formulated as per provision made in Article 50 of *Solid Waste Management Act, 2068*. The Rules contain 27 sections that provision the methodology, procedures, technology and execution of solid waste management.

Section 3 of the Rule describes about the segregation and management of solid waste. It has mentioned that while segregating solid waste in degradable and non-degradable waste at source, it is essential to segregate waste into hazardous and chemical waste. It also states that the local body will be responsible for conducting awareness program regarding source reduction, source separation and adopting suitable technologies.

Section 5 of the Rule outlines management and execution of hazardous/chemical waste. Similarly, Section 7 of the Rule states about the standard of vehicles for transportation of solid waste.

4.2.4 Local Self Governance Act, 2055(1999) and Local Governance Rules, 2056(1999)

The role of local government in the development and avoiding environmental degradation by promoting conservation and enhancement environmental activities is crucial. Realizing this hard core fact, GON has promulgated local governance act in 1998 and Local Governance Rules, 1999. The Act and Rule has followed the spirit of decentralization and strengthening the local government agencies. In a number of sections of this Act deals with land use planning and implementation, environmental conservation and land development. It also contains section dealing with land acquisition by local bodies.

Section 55 empowers VDC to levy taxes on utilization of natural resources. Section 68 lists the property of the VDC which includes natural resources. Section 189 of the Local Self-Governance Act provides the powers and functions of the District Development Committees (DDC) which include formulation and implementation of plans for conservation of forest, vegetation, biological diversity and soil.

Section 189 of the Local Self Governance Act provides the powers and functions of the District Development Committee (DDC) which include formulation and implementation of plans for conservation of forest, vegetation, biological diversity and soil.

4.2.5 Land Acquisition Act, 2034 (1977)

The *Land Acquisition Act, 2034 (1977)* with amendment in 2049 (1993) guides the compulsory acquisition of land in the country. The *Land Acquisition Act, 2034 (1977)* and the

Land Acquisition Rules 2026 (1969) are the two main legal instrument that specify procedural matters of land acquisition and compensation. Government can acquire land at any place in any quantity by giving compensation pursuant to the Act for the land acquired for any public purpose or for operation of any development project initiated by government institutions (Section 3 and 4). This Act empowers the government to acquire land for public purposes, by providing compensation for the private land and properties, as determined by the Compensation Fixation Committee.

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

4.2.6 Town Development Act, 2045 (1992)

The *Town Development Act, 2045 (1992)* was enacted taking into accounts the following objectives:

- To promote guided expansion of the existing townships into urban area,
- To provide necessary service and facilities to the residential citizens,
- To make necessary management of the required facilities to the economic interest of the urban people.

Clause 9 of this Act empowers the Town Development Committee to regulate control or prohibit any act or activities, which has an adverse effect on public health or the aesthetics of the town or any way pollutes the environment. It contains penalty provisions in the form of fines for the violation of the Act. However, no specific legal provision has been mentioned in this legislation regarding the solid waste management in the urban area. Amendment in this legislation has included word "Sewage system and sanitation" and conferred powers to Town Planning Board for planning and approval of the town planning.

4.2.7 Soil and Water Conservation Act, 2039 (1982)

The Soil and Water Conservation Act, 1982 and its Rules 1985 contain several provisions to regulate activities in the watershed area. However, the Project area has not been declared as a protected watershed and, therefore, the legal provisions thereof are not applicable for this Project.

4.2.8 Public Road Act, 2048 (1991)

The landfill site will require construction/improvement of access road for the transportation facility to the proposed landfill site and borrow areas, and, therefore, relevant provisions of the Public Road Act, 2048 may be attracted. Based on this Act, the Proponent, therefore, should plant road side trees and handover it to the local bodies for management and utilization purposes (Section 16). The Act also provides provisions to operate quarries and borrow pits and other facilities during road construction (Section 17).

4.2.9 Other Relevant Laws

The Labour Act, 2048 prohibits the over utilization of the labour. Section 27 of the Act has made the provision relating to health and safety of the hired labour. Section 4 states that prior work permit is required to the non Nepali citizens and they are allowed to work in Nepal for certain period only in the area where Nepalese work force is not available and not competent. Section 5 prohibits hiring of labour under 14 years old. Section 18 states that thirty minute must be allowed as rest and/or refreshment should be given in every five hours of work. This section also states over time shall be paid at the rate of 1.5 times normal wages rates. The normal working hour shall be 8 hours beyond that shall be considered as overtime.

Review of existing legal regime on the environment and sectoral legislation calls upon the Proponent to integrate environmental protection measures in this Project to avoid, mitigate or compensate adverse environmental impacts.

4.2.10 Plant Protection Act, 2064 (2007)

The Plant Protection Act, 2064 (2007) is made to provide laws for protection of plants enacting legal provisions for preventing the introduction, establishment, prevalence and spread of pests while importing and exporting plants and plant products, promoting trade in plants and plant products by adopting appropriate measures for their effective control.

Section 3 provisions establishment of committee to make advice and suggestions to the Government of Nepal on policies on the quarantine of plants or plants products. A person or body wishing to export plants, plant products, biological control agents or beneficial organism may obtain the phyto-sanitary certificate (Section 12). For the purpose of making inspection of plants, plant products, biological control agents, beneficial organism or other articles, the Ministry of Agriculture may designate any employee who possess the qualification as prescribed, as inspectors (Section 14). Section 23 states penalties to any person who commits the offenses set forth in various clauses of section 22 dealing with offense and penalties.

4.2.11 Aquatic Animal Protection Act, 2018(1961)

The provision of the Aquatic Life Protection Act, 1961 obliges the proponent to enforce necessary measures at construction sites in order to maintain aquatic ecosystem and safe movement of aquatic animal. The proponent should establish fish hatchery or a nursery, close to the dam site of the water resources projects (where fish ladder construction is not possible), for artificial reproduction and ex situ conservation (section 5b).

4.3 Guidelines and Manuals

4.3.1 National EIA Guidelines, 2050 (1993)

The National EIA Guidelines, 1993 developed by the National Planning commission (NPC) in conjunction with international Union for Conservation of Nature (IUCN), set out the process for the environmental review and management of infrastructure projects in all sectors and the respective roles of certain government agencies and the project proponents. These guidelines were part of a comprehensive program to develop the national and sectoral

guidelines for establishing a national system for environmental impact assessment which was a part of the Government's National Conservation Strategy and Nepal's Seventh Year Plan. The guideline was endorsed by the GoN on 27 September 1992 and gazette on 19 July 1993.

The Guideline includes elaborated procedures for EIA report preparation and also includes key areas to be looked into (socio-economic, biological and physic-chemical, and cultural impacts) during the EIA study. The guideline also provides a basis for proposing environment protection measures in order to avoid, eliminate, minimize and/or mitigate each adverse impact and to augment beneficial impacts resulting from the Project (NPC, 1993).

4.3.2 Environment Management Guidelines, 1997 and the EIA Policy Document for the Road Sector (DoR 1997 and 2000)

During the implementation of this Project, an access road should also be constructed/improved which can be made environment friendly by considering the issues and aspects as included in the Environment Management Guidelines, 1997 and the EIA Policy Document for the Road Sector (DoR 1997 and 2000).

Environment Management Guidelines, 1997 highlights operational practices for all road maintenance, rehabilitation and construction activities. The guideline consists of environmental mitigation measures to be incorporated into road projects, procedures for public participation, and socio-economic considerations. Implementation methods for undertaking mitigation measures for each of the activities are also given in the guideline. The Guideline suggests methods for determining how and when the public should be included in the environmental analysis. The guidelines also advise on socio-economic impacts and strategies for reducing or avoiding the potential negative impacts and for maximizing the beneficial impacts to local residents.

The EIA Policy Document for road sector explains how environmental practice be incorporated in road construction activities. It gives clear, practical guidance and explains where more information can be found in support of particular issues. Emphasis is given to straightforward, achievable and effective measures which can be incorporated into engineering practice to achieve the main principles of sound environmental management.

4.3.3 Urban Environment Management Guideline, 2068

The Urban Environment Management Guideline, 2068 has been enacted in order to minimize adverse environmental impacts due to development activities in the urban area; to protect and preserve national heritage; to assure human health related rights; and to ensure clean environment friendly sustainable urban development.

The guideline deals with management of solid waste and hazardous waste; minimization of air pollution and energy consumption; minimization of noise pollution; supply of drinking water, its quality and minimization of water pollution; Greenery, open space and agricultural land conservation; management of urbanization, building design and energy technology etc. The guideline also elaborates on management of institutional requirement for the implementation of urban environment management guideline. The guideline further categorizes hazardous wastes in terms of waste from industry; chemical characteristics; hazardous nature etc.

The Generic Standards, Tolerance Limits for Wastewater Discharged into Inland Surface Water from Combined Waste Water Treatment Plant as outlined in Schedule 2 of the Guideline is as follows.

S. No.	Parameter	Tolerance Limits
1	Temperature, °C	< 40
2	pH	5.5 ~9.0
3	Total Suspended Solids, (mg/l)	50, *max*
4	BOD_5 at 20°C, (mg/l)	50, *max*
5	Oils and Grease, (mg/l)	10, *max*
6	Phenolic Compounds, (mg/l)	1, *max*
7	Cyanides as CN, (mg/l)	0.2, *max*
8	Total Residual Chlorine, (mg/l)	1
9	Sulfides as S, (mg/l)	2, *max*
10	Fluorides as F, (mg/l)	2, *max*
11	Arsenic as As, (mg/l)	0.2, *max*
12	Cadmium as Cd, (mg/l)	2, *max*
13	Hexavalent Chromium as Cr, (mg/l)	0.1, *max*
14	Copper as Cu, (mg/l)	3, *max*
15	Lead as Pb, (mg/l)	0.1, *max*
16	Mercury as Hg, (mg/l)	0.01, *max*
17	Nickel as Ni, (mg/l)	3, *max*
18	Zinc as Zn, (mg/l)	5, *max*
19	Selenium as Se, (mg/l)	0.05, *max*
20	Ammoniacal Nitrogen, (mg/l)	50, *max*
21	Chemical Oxygen Demand, (mg/l)	250, *max*
22	Silver, (mg/l)	0.1, *max*

4.4 Institutions

4.4.1 Local Institutions

(a) Birgunj Sub-Metropolitan City

Birgunj Sub-Metropolitan City is the city whose solid waste is going to be disposed off in the proposed landfill site. The operation of the landfill site will be carried out by the municipality. The Municipality might provide recommendation letters for inclusion in the EIA study report for its timely approval from the MoSTE. The Municipality must ensure that only the municipal wastes are disposed off in the proposed landfill site, proposed mitigation measures for the operational phase and monitoring activities are carried out as suggested in the EIA report.

Implementation of the Project will be the responsibility of Project Manager, Project Implementation Unit (PIU), STIUEIP-Birgunj with technical assistance from Department of Urban Development and Building Construction (DUDBC), Project Coordination Office (PCO) that will undertake environmental assessment functions, as well as monitoring of sub-projects and provision of advice relating to design of environmental mitigation and enhancement measures, and the setting of environmental quality standards.

(b) Village Development Committee

The proposed landfill site is located at Ward 7 and Ward 9 of Itiyahi and Bishrampur VDC respectively of Bara District. The Municipality might provide recommendation letters for inclusion in the EIA study report for its timely approval from the MoSTE. The VDC can educate the local people and facilitate in convincing for necessary support for Project construction in time. Based on the *Local Self-Governance Act (1999)*, the VDCs can plan and implement the environmental conservation programmes and the Project can assist in VDC's activities. The VDC will facilitate the Project in issuing permits regarding the use of necessary quarries, borrow pits, spoil and construction waste disposal area and temporary land required for construction purpose.

(c) District Administration Office

The District Administration Office (DAO), Parsa and Bara could assist the Project in avoiding and/or resolving any conflict during the Project implementation. Similarly, the Chief District Officer of the respective districts might facilitate the implementation of the Project by issuing permits regarding the use of necessary quarries, borrow pits, spoil and construction waste disposal area and temporary land required for construction purpose.

(d) District Development Committee

The Parsa DDC and Bara DDC could play a pivotal role for timely completion of the Project by educating local people and also enabling the Project in resolving any conflict during Project implementation.

4.4.2 National Institutions

(a) Ministry of Science, Technology and Environment (MoSTE)

Once the EIA report is received, MoSTE might approve it in stipulated time period as per the EPR, 1997 with view to assist the Proponent to implement the Project in time. As per the environmental law, MoSTE should be involved in preparing the environmental auditing report after two years of operation of the Project. Also it can appoint or designate environmental inspectors to ensure the compliance of the environmental requirements, if any, during the construction and operational stages. Furthermore, MoSTE has ample opportunities to issue guidance and instruction(s) to make the Project environmentally sound and sustainable.

(b) Ministry of Urban Development

Within the urban sector, the Ministry of Urban Development (MoUD) as Project Execution Agency has overall responsibility for environmental safeguarding. The specific responsibility is as follows:

- Review and comments on EIA for final approval from MoSTE.
- Give permission for Project Implementation.
- Review of monitoring reports of project construction and operation and give comments for corrective actions.

(c) Department of Urban Development and Building Construction (DUDBC)

The DUDBC, Project Coordination Office (PCO), as co-ordination, monitoring and implementation agency is responsible for overall coordination, monitoring and implementation of STIUEIP and environmental monitoring/management works assisted by Project Management Support Consultant (PMSC). The specific responsibility is as follows:

- Review and comments on EIA for final approval from MoSTE.
- Give permission for Project Implementation.
- Review project design & contract documents against approved EIA measures and national environmental standards and give comments for corrective actions.
- Review of monitoring reports of project construction and operation and give comments for corrective actions.

4.5 International Convention

The number of legally-binding international instruments (conventions, treaties, protocols or agreements) have been adopted for the conservation of biological species and the natural environment. Nepal has also ratified or accessed a number of such instruments and she has lots of obligations and commitments on the management of natural environment and biodiversity. As per the Nepal Treaty Act, 1991 [Section 9(1)], the provisions included in such international instruments are above the national laws.

4.5.1 Convention on International Trade for Endangered Species (CITES) of Wild Fauna and Flora, 2032 (1973)

Nepal is the Party to the Convention on Biological Diversity (CBD), Convention on the International Trade in Endangered Wild Fauna and Flora (CITES), Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention) and World Heritage Convention, which are related to species conservation, international trade of species and their products, and conservation of wetlands, and natural and cultural heritage. The country as a whole is obliged to implement the Convention's provisions. The project area does not contain World Heritage Sites and Wetlands of International Importance. Furthermore, the Project will not be involved in the international trade of wild fauna and flora. However, the Project will make every effort to respect the provisions of such environment-related instruments and least damage the natural resources and the environment.

4.5.2 The Convention on Biological Diversity, 2050 (1992)

The Convention on Biological Diversity was signed by Nepal at Rio de Janeiro on June 12, 1992. The convention and particularly Article 14 provides broad framework on the need for carrying out EIA to minimize adverse impacts of the projects and programs on biodiversity.

4.5.3 Nepal is signatory to many international convention, which deal with the protection of environment. Some of them are as listed below:

- Convention on International Trade in Endangered Species of Wild Fauna and Flora, (CITES), 1973.
- UN Convention to Combat Desertification, 1994.

- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their disposal, 1989.
- Viena Convention for the Protection of the Ozone Layer, 1985.
- UN Framework convention on Climate Change, 1992.
- Plan Projection Agreement for the South East Asia and the Pacific (as amended), 1956.
- Convention on Biological Diversity, 1992
- Conservation for the protection of the World Cultural and Natural Heritage, 1972.

Besides the international legally binding instruments, there are other instruments such as Stockholm declaration, Rio declaration and also Agenda 21 – a blue print of action – for the 21st century, which obliges the UN member states to adopt necessary measures on EIA application so as to minimize potential environmental impacts and augment beneficial environmental impacts. The Stockholm and Rio Declarations also encourage the UN member States to integrate EIA process in the overall decision-making, planning and implementation of the development projects and programmes.

In this context, there are ample opportunities to internalize and institutionalize EA system in avoiding and mitigating adverse environmental impacts and make the development initiatives environment-friendly, economically beneficial and sustainable.

4.5.3 Basel Convention

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal was adopted on 22 March 1989 by the Conference of Plenipotentiaries in Basel, Switzerland, in response to a public outcry following the discovery, in the 1980s, in Africa and other parts of the developing world of deposits of toxic wastes imported from abroad. The overarching objective of the Basel Convention is to protect human health and the environment against the adverse effects of hazardous wastes. The provisions of the Convention center around the following principal aims: (i) the reduction of hazardous waste generation and the promotion of environmentally sound management of hazardous wastes, wherever the place of disposal; (ii) the restriction of transboundary movements of hazardous wastes except where it is perceived to be in accordance with the principles of environmentally sound management; and (iii) a regulatory system applying to cases where transboundary movements are permissible.

4.5.4 Minamata Convention

The objective of the convention is to identify and promote good practices relating to the use of human rights obligations and commitments to inform, support and strengthen environmental policy making, especially in the areas of environmental protection and management. A Global Symposium on Environmental Rule of Law, held at the first United Nations Environment Assembly (UNEA) in Nairobi, brought together Chief Justices, Heads of Jurisdiction, Attorneys General, Auditors General, Chief Prosecutors, lawyers and legal experts to raise awareness of the role of environmental law as an indispensable tool in achieving sustainable development and a Green Economy.

5. EXISTING ENVIRONMENTAL CONDITION

5.1 Physical and Chemical Environment

5.1.1 Geophysical: Location, Topography, Geology and Soils

The proposed Sanitary Landfill Site for Solid Waste Management of Birgunj Municipality lies in Itiyahi and Bishrampur VDC Ward No. 7 and 9 respectively of Bara District in Central Development Region of Nepal. The Singaha river located on the western part of the proposed sanitary landfill site touches Ward No. 19 of Birgunj Sub-metropolitan city. The proposed sanitary landfill site is linked with Birgunj via existing 1.0km gravel road from Nagwa ward no. 19.

The proposed SLF with a total area of 10.76 ha is located in the Terai plain. Geographically it is located at 26°59'47" north latitude and 84°53'20" east longitude with average altitude of 80.5m. The landfill site area consist plain terrain mainly of quaternary sediments constituting cultivated land. It is composed of very fertile soil mixed of clay, silt and sand. The geological profile is presented in **Figure 5.1**.

Birgunj Municipality, with a total area of 21.17 sq.km., is located in the Terai plain (northward extension of Indo-Gangetic plain). It lies in Parsa district of Narayani zone in Central Development Region of Nepal. There are 19 wards in this municipality. Geograplhically, it is located between 26°57'45" - 27°02'30" north latitude and 84°52'15" - 84°55'00" east longitude. The eastern part of this city is bordered by another district – Bara whereas the southern and south western part by Bihar State of India. Birgunj is one of the major gateway town to India and more than 50% of total foreign trade is carried out via this town.

Birgunj Sub-metropolitan city has elongated shape with a maximum north-south length of 8 km and east-west width of 4 km. The altitude ranges from about 78 m in south near border area to 87m in the north. However, there is high micro-topographical variation.

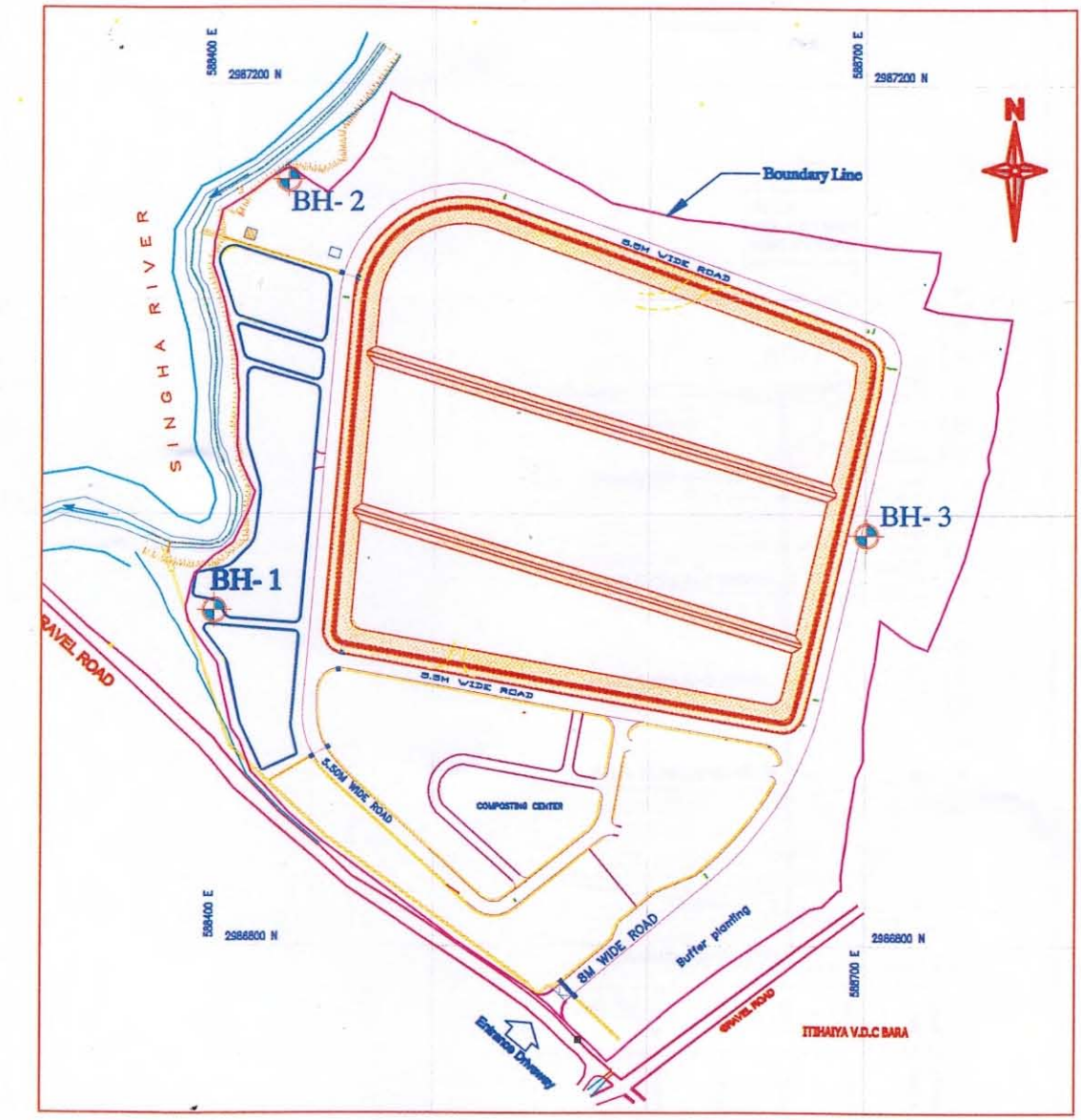
5.1.2 Climate

The climatic condition is sub-tropical monsoon with very hot and wet summer. The mean annual temperature ranges from 23.8°C to 24.5°C. The maximum extreme daily temperature recorded is 41.6°C in May and minimum is 4.5°C in January. The annual rainfall ranges from about 1300 mm to 2800 mm with an average of 1800 mm. More than 82% precipitation occurs in 4 summer months (June to September). Average sunshine duration ranges from 7.26 – 7.50 hr/d and average wind speed ranges from 1.95 – 2.31 km/hr.

5.1.3 Surface and Ground Water

Basin area of Singaha river up to the Sanitary landfill (SLF) site located at eastern side of Birgunj is 12km^2 having 20 years flood level at 79.486m and flood discharge of 49.02m^3/s. The ground water table at the western part of the SLF near the singaha river varies between 4.25m to 3.75m below ground level whereas the eastern part possesses 2.50m below the ground level.

Figure 5.1 Geological P



Secondary Towns Integrated Urban Environmental Improvement Project (STIUEIP) Birgunj Sub-Metropolitan City , Nepal

Designed & Spervision consultant :

SMEC In Association with

BDA

ofile of the Landfill Site

नेपाल सरकार
वन, वातावरण तथा भूसंरक्षण मन्त्रालय
सिंहदरबार, काठमाण्डौं

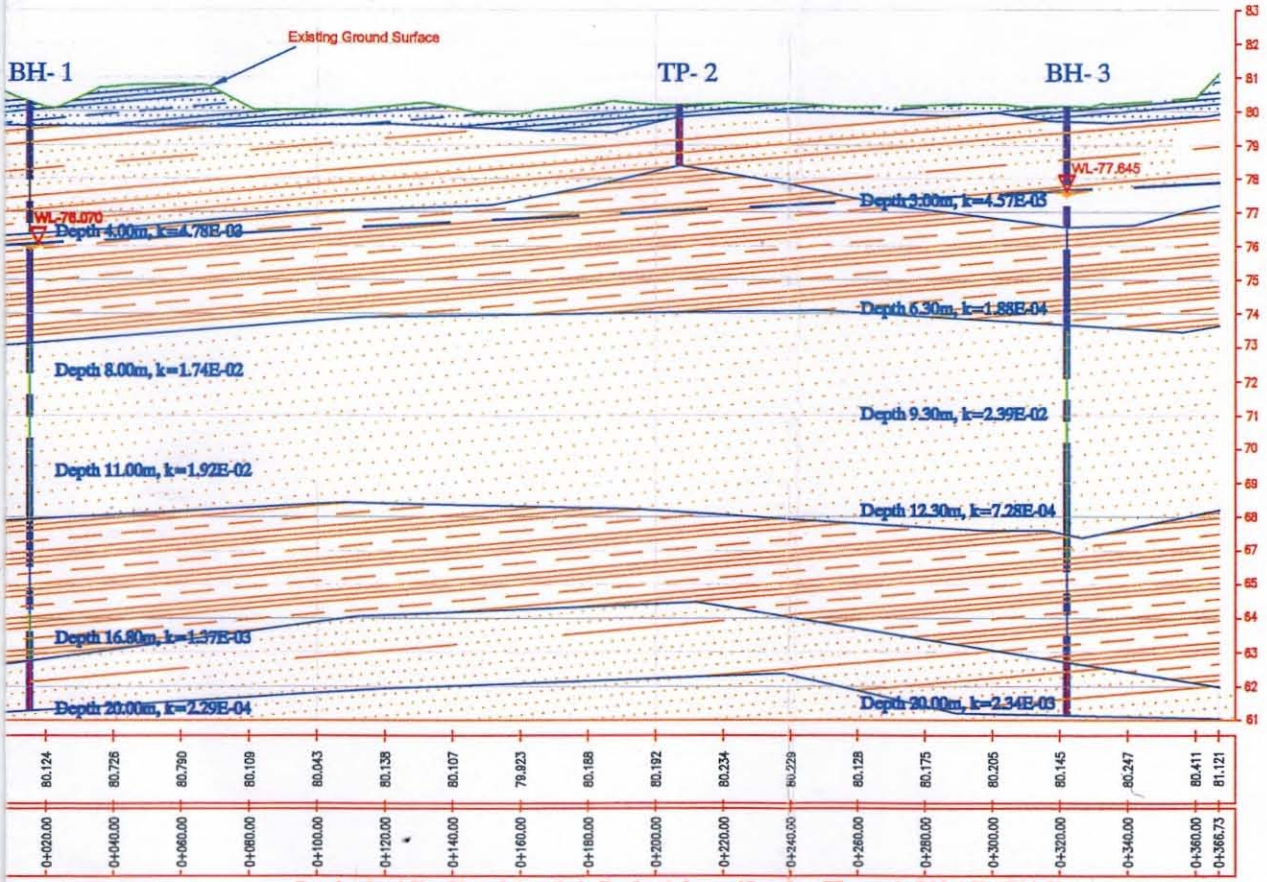
LEGENDS
SILTY CLAY

CLAY WITH OCCASIONAL SILT AND SAND

FINE MEDIUM SILTY TO CLEAN SAND

BH- 1
EGL = 80.30
FWT =76.070

BH- 3
EGL = 81.145
FWT = 77.645



INAGE : 0+000.00 - 0+366.73

Geological Profile of the Sub Project Area (Section Through BH-1 To BH-3)

Title: SUB-SURFACE SOIL STRATA CROSS SECTIONS OF BH-1, TP-2 & BH-3 INTEGRATED SOLID WASTE MANAGEMENT	Drawn By : G.P. Chaudhary Designed By : RM Miranda Checked By : N. Jha Approved By :	Scale 0 2.0 4.0 6.0m 1:100 (V) 0 20 40 60m 1:1000 (H)	Date : – July 2013 Drawing No. 5 Sheet No. 2 of 4

Birgunj is drained by two rivers – Sirsiya in the west and Singaha in the east. Singaha river originates about 4 km upstream from the northern border of the municipality whereas Sirsiya originates from far northern area. These rivers are flooded during summer monsoon and river bank cutting particularly at the meander bend during flooding is common. The water in these rivers during dry winter period is very low.

5.1.4 Land Use and Land Cover

The land use type of the SLF is agricultural land with sparse vegetation owned by the Birgunj Municipality holding land ownership certificate.

For Birgunj nearly 73% area is under cultivation followed by residential area (11%), rural residential area (2.1%), business mixed with residential area (4.3%), industrial area (3%), institutional area (4.3%), open land (0.7%), and ponds (0.4%).

5.1.5 Slope Stability

The proposed Sanitary Landfill Site is stable and no traces of soil erosion is detected which is harmful to waste landfill works.

5.1.6 Air and Noise Level

As the proposed sanitary landfill area in Itiyahi and Bishrampur VDC of Bara District lies in the rural settings not affected by industrial emissions, vehicular movement and other infrastructures developments, the air and noise of the subproject area is assumed fair at present condition.

Information on air quality of Birgunj is scanty. The only available data is 8-hour survey conducted in 2000 (**Table 5.1**). It shows a very high concentration of particulate matters less than 10 microgram and total suspended particulates in the air as compared to the national standard and the standards fixed by WHO. Birgunj had higher carbon monoxide and lead concentration in the air as compared to other part of the country located in middle hills.

Table 5.1: PM_{10}, TSP, SO_2, NO_2, CO, and Pb Measurements

Site	Altitude (masl)	Date	Time	Parameters					
				PM10 ($\mu g/m^3$)	TSP ($\mu g/m^3$)	SO2 ($\mu g/m^3$)	NO2 ($\mu g/m^3$)	CO ($\mu g/m^3$)	Pb ($\mu g/m^3$)
Birgunj	091	30/11/2000	10:00 – 18:00	782.90	567.80	63.00	23.00	378.00	0.27
Tolerance				120	230	70	80	10,000	0.50

Source: Nepal Health Research Council and Nepal Environmental and Scientific Services (P) Ltd., Nepal Gazette B.S. 2060/4/19 (August 2003).

Many families within the project VDC are using fuel-wood and dung-cakes for cooking. Indoor pollution is another environmental problems associated with health hazard.

The landfill site area does not have any form of noise pollution as such because there is no outside encroachment. The vehicular movement is very low with no industry nearby. The nearest settlement from the proposed SLF is Mushharwa in Bishrampur VDC which is 2km east of SLF and Itiyahi settlement located around 2km North East of SLF. Nagwa ward No. 19 of Birgunj Municipality is around 1km west of SLF connected by existing gravel road.

5.1.7 Water Quality

(a) Surface Water

The surface water quality of Singaha river flowing north to south at the western side of the proposed landfill site is fairly good. The surface water quality sampled and tested at upstream and downstream of the landfill site is presented in **Annex 8**. People are very much concerned about the surface water to be polluted by Solid Waste dumping operation.

(b) Ground Water

Ground water quality of the project area was tested taking sample from nearby tube well. The quality of the water was noted potable for drinking purpose. The physical and chemical characteristic of the groundwater is kept in **Annex 8**.

5.1.8 Odor Level

Presently, there is no odor problem encountered in the project vicinity. In other words, the project area is quite pristine in terms of air, noise and odor level.

5.2 Biological Environment

The subproject area does not fall in any restricted areas, places of cultural, historical and archeological importance / monuments, conservation areas, wild life national parks, and any other places where the law of the land prohibits any construction activities. Parsa Wildlife Reserve is located around 31km north of proposed Sanitary Landfill Site. It is indicated in Figure 3.1: Location Map.

5.2.1 Flora and Fauna

The proposed SLF consists of agricultural land with sparse vegetation mostly concentrated at the western part constituting trees of girth size ranging from 0.3m to 0.90m. The details of the major trees noted within the proposed landfill site area are as follows:

S.No.	Tree Size (Girth)	Species	Numbers
1	>0.30 – 0.60m	Masala (*Eucalyptus camaldulensis),* Sisau *(dalbergia sisso)*, Sirish *(albizia sp)*, Teak *(tectona grandis)*, Biruwa, Kukath (*Indigofere atropurpurea)*, Chhatiban, Bachkarai, Mango *(magnifera indica),* Jamun *(syzygium cumini)*, Runi, Nimbu *(azadirachta indica),* Sohajan, Gagal, Pithwa	633
2	>0.60 – 0.90m	Sirish *(albizia sp)*, Sisau *(dalbergia sisso)*, Masala (*Eucalyptus camaldulensis),*Bachkarai, Tilka, Mango *(magnifera indica),* Bel, Kathar, Runi, Gular, Bayar, Pithwa, Kadam, Simal (*Bombax ceiba var. leiocarpum),* Kukath (*Indigofere atropurpurea)*	92
3	>0.90 – 1.80m	Pithwa, Peeple *(ficus religiosa)*, Kadam *(anthocephalus chinensis),* Sisau *(dalbergia sisso)*, Mango *(magnifera indica), Bachkarai*	8

Almost all the area within the municipality is under cultivation and built up area. There is no natural forest area with considerable size except a few patches of orchard and nurseries scattered in different places. The flora species found in Birgunj are Sisau *(dalbergia sisso)*, Siris (albizia sp), Kadam *(anthocephalus chinensis)*, and groves of Bamboo *(Bombax sp)*. Groves of bamboo are common found in the area. Exotic species such as Sapeta is also found in different parts of Birgunj. Kans and Narkat are also found in the flood plain and banks along the river.

Mammals reported from the subproject area are Nyauri (*Herpestes edwardsi)*, Syal (*Canis aureus)* and Musa (*Rattus rattus)*. Major bird species reported are Battai, Bhangera (*Passer domestica*), Saras (*Grus antigone)*, Suga (*Psittacala krameri)*, Koili (*Eudynamys scolopacea)*, Parewa (*Columba livia)*, Dhukur *(Streptopelia orientalis)*, Dangre (*Aeridotheres fuscus)* and Kauwa (*Corvus macrorhynchos)*.

In the context of fish and other aquatic animals, Occasional ponds and seasonal river (Singaha river) provide aquatic habitats in which small fish, frogs and a range of invertebrates are invariably found. It is likely that surface water flows in the wet season are important for the distribution of aquatic organisms.

5.3 Socio-economic and Cultural Environment

5.3.1 Population, Communities and Occupation

As per Population Census of 2011, total population of the Itiyahi and Bishrampur VDC is 6,659 and 6,321 and household number is 977 and 912 respectively. Male comprises about 53.24% while female 46.76% for Itiyahi and 52.46% male and 47.54% female for Bishrampur VDC. The population by caste/ethnic group comprises Muslim (13.43%), Tharu (11.31%), Yadav (10.43%), Brahmin Hill (5.29%), Kanu (4.64%), Koiri (4.51%), Teli (4.11%), Chamar, harijan (4.11%), Kurmi (3.95%), Tamang (3.47%), Kalwar (3.34%) and Chhetri (3.09%). Total literacy rate is 55%. *(District and VDC profile of Nepal-2010).*

Similarly, As per census 2011, Birgunj Municipality had a total population of 135,904 with annual district growth rate of 1.90%. Male comprises about 53.405% and female 46.595%. There are more than 70 caste/ethnic groups. Among them 20 caste/ethnic groups have population more than 1% in the total population. Those are Muslim (17.4%), Kanu (7.3%), Hill Brahamin (7.3%), Kurmi (5.9%), Newar (5.6%), Kalwar (4.5%), Marwadi (4.4%), Sonar (4.1%), Chhetry (3.9%), Baniya (3.3%), Kayastha (3.3%), Yadav (2.7%), Terai Brahamin (2.7%), Teli (2.4%), Tharu (1.8%), Koiri (1.7%), Rajput (1.4%), Badhae (1.4%), Dhanuk (1.3%) and Nuniya (1.2%). *(District and VDC profile of Nepal-2010).*

About 52% of the Population involved in economic activity above 10 years of age is economically active. Majority of the economically active population is engaged in agriculture followed by trade, service and labor. Total literacy rate is 69.5%, comprising of 79.21% among male and 57.72% among female. The town is experiencing high level of in-migration. This has resulted into the emergence of squatter settlement in several areas of the town.

Total literacy rate is 39.4% for Bishrampur VDC and 32.7% for Itiyahi. Economically active population is engaged in agriculture followed by trade, service and labor. *(District and VDC profile of Nepal-2010).*

5.3.2 Project Affected Family

There are no project affected families within the proposed landfill site area. All the land area is owned by the Birgunj Municipality. Temporary structures and people living illegally within the project area are nil, thus land acquisition and resettlement issues need not to be assessed. The waste collection and transportation will be carried out within the existing footprint without affecting the private properties of Birgunj Municipality. The nearest settlement from the proposed SLF is Mushharwa in Bishrampur VDC which is 2km east of SLF and Itiyahi settlement located around 2km North East of SLF. Nagwa ward No. 19 of Birgunj Municipality is around 1km west of SLF connected by existing gravel road. However, detail of land owner whose land has been acquired by the Municipality is presented under Section 5.3.10 under this Chapter.

5.3.3 Health and Sanitation

Bara District consists of 1 Government hospital, 4 primary health care centre, 11 health posts, 83 sub health posts, 300 primary health care out reach clinic and 492 EPI clinic. Present sanitation coverage is 17.49% - rural and 52.50% - urban, and present water supply coverage is 88.04% - rural and 100% in urban.

Birgunj has 8 hospitals, 2 institute of medical sciences, 2 Nursing Homes and one clinic. Those hospitals are Narayani zonal hospital, A.M.C hospital, Sabottam Maternity home, Kediya eye hospital, Shiva hospital, Shree Ram hospital, national medical hospital, and M.B. Kediya dental hospital. The present sanitation coverage of Itiyahi and Bishrampur is 19.06% while water supply coverage is 88.58%.

The common diseases reported are gastroenteritis and diarrhea. It may be due to poor water quality, lack of proper surface drainage systems and solid waste management.

According to Municipality Profile (2007), there are approximately 4.70 main and 40.54 km tributary drains for storm water discharge. These existing drains are not adequate. So, inundation and flooding during rainy season are common.

There is no centralized sewerage collection and disposal system in Birgunj. The present system of sewage disposal is the on-site sanitation with septic tank and soak pits. The Municipality Law requires each household to construct a toilet and a septic tank. About 51% households do have modern toilet, additional 22% households have ordinary toilet but 25% households do not have toilet. Though most of the houses do have septic tank, but very few have soak pits for soaking away the effluent of the septic tank. The disposal of the septic tank effluent directly to open road-side drains is causing serious environmental and health hazard. During the dry period, the situation is worst due to absence of diluting storm water. The municipality does not have facilities for the collection and disposal of the septic tank solids. Generally the private operators provide these kinds of services and were found to dispose the solids in the road side drains or in the vacant land. As a result the possibility of infecting from water borne diseases including germination of mosquito in the region is very high.

5.3.4 Solid Waste Management

Solid waste is collected by Birgunj Municipality. It provides waste collection and sweeping services. The containers/bins are placed at different strategic locations which are used by

households, institutions and the commercial sector in the town. There is no organized door-to-door collection system in Birgunj. Majority (78%) of the households dispose their waste still in public places and only 10.5% households use fixed places or containers. Waste is transported using tractors and open trailers. In the absence of a permanent sanitary dumping site, a daily estimated 47.57 tons of garbage is being dumped haphazardly along river banks, ponds, by-pass road and open spaces. Nearby areas of those places are prone to serious health hazard.

5.3.5 Industries

Around 43 industries are registered and approved in the Bara district most of them concentrated near Tribhuvan Rajmargh in between Birgunj and Pathlaiya road.

According to district profile (2007), more than 163 different type of industries are located within the Birgunj municipality. The major types are soap, plastic, textile, garment, metal, leather, distillery, pharmaceutical etc. There are many big and small industries located along Birgunj-Simara Highway in the upstream area. Many industries do not have affluent treatment facilities and it is directly disposed to local streams. As a result, local streams downstream from the site of such streams are polluted. Sirsiya river which is frequently flooded in the western part of the municipality is highly polluted from effluent directly discharged in the river. It has increased the risk of health hazard.

5.3.6 Agriculture Development

Agriculture is still the major source of family income of majority of people living outside the city core. Paddy, wheat, maize, jute, sugarcane, potato are the major crops grown in this area. Lentills and peas are also grown. The fruits commonly grown are mango, leechi, pineapple, banana and lemon. Similarly, vegetables like cauliflower, cabbage, lady finger are also grown.

5.3.7 Infrastructure Facilities

Water Supply: The main source of drinking water in Birgunj and Bara is the deep tube well ground water. Bara District consists of total 18,633 tap/piped water system and 85,671 tubewell/hand pump. At present there are four pumping stations operated by Nepal Water Supply Corporation that supply 8 million liters of water to the Sub-metropolitan city. Nearly 6,067 households have piped water supply facility, 1,210 households have drinking water facility from public shallow tube wells and 7,819 households have drinking water facility from shallow tube wells. The water quality from deep tube wells is reported to be safe for drinking water but from shallow tube wells is usually contaminated by surface water and seepage of wastewater.

Communication: Birgunj has good communication system. More than 13,800 telephone line has been distributed. There are three post offices, four FM radios, 6 currier services and quite a few internet facilities within the municipality. More than 199 daily, weekly, monthly and quarterly newspapers are published.

Similarly Bara district possesses around 4270 telephone line. There are 1 district post office, 13 regional post office, 70 additional post office facilities with 35 daily, weekly, monthly newspapers.

Transportation: Birgunj and Bara district is quite accessible. It is linked with different places via the Tribhuvan Rajpath and East-West Highway. There are around 83km black toped

road, 68km gravel road and 16km earthen road in Bara District. Similarly, there are 115 km of black toped road, 83 km graveled and 82 km earthen roads and a number of trails within the municipality. Overall roads in Birgunj are in a poor condition. Simara Airport is located about 22 km to the north of the city. There are more than 5200 Riksa, 313 Tempu and 456 Tanga in Birgunj providing transportation services. Traffic congestion particularly in the city centre is observed.

Electricity: Electricity supply operated by NEA is from the national power grid. There are more than 15245 service connections in which 14,100 is for the purpose of domestic use, 860 for industrial, 50 for commercial and 8 for drinking water. In Bara district, total 74,169 population use electricity, 31,934 kerosene, 179 biogas and 926 solar energy.

Electricity is mainly used by majorities for lighting purpose whereas wood is still found to be major source of energy for overall domestic purposes i.e. cooking and boiling. Kerosene and dung patch/cake are also used by large number of people. It shows the higher possibility of infection from the indoor pollutions.

Institutions: Birgunj is also an administrative centre. There are more than 70 regional and district level administrative offices located within this municipality. There are more than 48 primary schools, 7 lower secondary, 40 secondary, 3 higher secondary schools, 10 campuses and 15 technical and computer training institutions within this municipality. Many INGOs and NGOs are working in the Municipality.

In Bara district, there are total 58 pre-primary, 14 primary, 12 lower secondary, 9 secondary and 7 higher secondary schools.

5.3.8 Qualities of Life Values

The proposed sub-project is not expected to adversely affect any cultural or recreational resources but will increase the existing quality of life values due to the improvement in hygiene and health. Several mitigation measures have been proposed in order to reduce adverse environmental impacts wherever it is necessary.

5.3.9 Historical/Religious Sites/Practices/Culture

Maisthan, Birta, Alakhiya, Gita, Mahabirsthan temple, Bisma stupa are some of the historically and religiously important places in the Birgunj Municipality. The nearest world heritage site i.e Chitawan National Park is located more than 35km far from this area.

5.3.10 Project Affected People

(a) Land Acquisition Details

The following are the detail of project affected people whose land has been acquired by the BSMC for development of Sanitary Landfill site at Itiyahi and Bishrampur VDC of Bara District. BSMC has paid reasonable compensation for the land intake and the project affected people are satisfied with the compensation provided by BSMC. Now the land is owned by BSMC. It is to be noted that the entire land owner resides in Birgunj Municipality though their land is located in Bara District.

S.No.	Land Owner Name	Land Kitta No.	Area in Kattha	Land Location	Residence Address
1	Bir Bahadur Raut Barai	570	6.50	Bishrampur-9, Bara	Nagwa, Birgunj-19
2	Ram Chandra Prasad Barai	77	2.0	Bishrampur-9, Bara	Nagwa, Birgunj-19
		801	2.96	Bishrampur-9, Bara	
3	Ram Kishun Raut Barai	890	0.90	Bishrampur-9, Bara	Nagwa, Birgunj-19
4	Bijendra Prasad Chaurasiya	269	0.50	Itiyahi-7, Bara	Nagwa, Birgunj-19
5	Shanker Prasad Chaurasiya	92	2.75	Bishrampur-9, Bara	Nagwa, Birgunj-19
		803	2.95	Bishrampur-9, Bara	
6	Shiv Raut Ahir	85	2.25	Bishrampur-9, Bara	Nagwa, Birgunj-19
7	Prabhu Prasad Chaurasiya	293	9.38	Itiyahi-7, Bara	Nagwa, Birgunj-19
8	Priti Barnwal & Nilam Agrawal	1611	5.70	Bishrampur-9, Bara	Nagwa, Birgunj-19
9	Srikanti Devi	478	2.50	Itiyahi-7, Bara	Nagwa, Birgunj-19
10	Bramdev Raut Barai	246	0.80	Itiyahi-7, Bara	Nagwa, Birgunj-19
11	Shambhu Prasad Chaurasiya	294	16	Itiyahi-7, Bara	Nagwa, Birgunj-19
		292	8.63	Itiyahi-7, Bara	
12	Manti Devi Baraini	96	5.5	Bishrampur-9, Bara	Nagwa, Birgunj-19
		614	4	Bishrampur-9, Bara	
		1002	3	Bishrampur-9, Bara	
13	Amrika Prasad Barai	247	1.6	Itiyahi-7, Bara	Nagwa, Birgunj-19
		172	6	Itiyahi-7, Bara	
		173	6	Itiyahi-7, Bara	
		949	1.5	Bishrampur-9, Bara	
14	Mina Devi Barain	479	3.5	Itiyahi-7, Bara	Nagwa, Birgunj-19
15	Sri Kanti Devi Samet	247	0.80	Itiyahi-7, Bara	Nagwa, Birgunj-19
16	Lakhiya Kumin	502	3	Bishrampur-9, Bara	Nagwa, Birgunj-19
		950	4.5	Bishrampur-9, Bara	
17	Chhatho Devi Dhobin	621	2.38	Bishrampur-9, Bara	Nagwa, Birgunj-19
		626	0.63	Bishrampur-9, Bara	Nagwa, Birgunj-19
18	Yasoda Devi Barai Chaurasiya	802	6.73	Bishrampur-9, Bara	Nagwa, Birgunj-19
		569	6.50	Bishrampur-9, Bara	
19	Rambha Devi	1612	7	Bishrampur-9, Bara	Nagwa, Birgunj-19
20	Jogindar Mahato Koiri	79	8	Bishrampur-9, Bara	Nagwa, Birgunj-19
		618	0.25	Bishrampur-9, Bara	
21	Chhaneshari Devi Dusadhin	76	7.5	Bishrampur-9, Bara	Nagwa, Birgunj-19
22	Laxmi Mahto Koiri	615	8	Bishrampur-9, Bara	Nagwa, Birgunj-19
23	Ram Bihari Raut Barai	1424	0.72	Bishrampur-9, Bara	Nagwa, Birgunj-19
		1425	0.72	Bishrampur-9, Bara	
		1422	0.72	Bishrampur-9, Bara	
		1423	0.72	Bishrampur-9, Bara	
		1426	0.72	Bishrampur-9, Bara	
24	Mahendra Mahato Koiri	495	8	Bishrampur-9, Bara	Nagwa, Birgunj-19
		86	3.75	Bishrampur-9, Bara	
		616	0.25	Bishrampur-9, Bara	
		617	2.75	Bishrampur-9, Bara	
25	Hari Shankar Pd. Chaurasiya	326	5	Itiyahi-7, Bara	Nagwa, Birgunj-19
		1217	1.25	Bishrampur-9, Bara	
26	Ramkalash Pd. Barai	325	5	Itiyahi-7, Bara	Nagwa, Birgunj-19
27	Parmawati Devi Barai	1218	1.75	Bishrampur-9, Bara	Nagwa, Birgunj-19
28	Ram Sakal Pd.Chaurasiya	1215	1.25	Bishrampur-9, Bara	Nagwa, Birgunj-19
		327	5	Itiyahi-7, Bara	
29	Subhgiya Baraini	90	1.5	Itiyahi-7, Bara	Nagwa, Birgunj-19
		91	2	Itiyahi-7, Bara	
		263	6	Itiyahi-7, Bara	
		270	0.5	Itiyahi-7, Bara	
30	Manti Devi	494	3	Bishrampur-9, Bara	Nagwa, Birgunj-19
31	Shiv Shankar Pd. Chaurasiya	324	5	Itiyahi-7, Bara	Nagwa, Birgunj-19

S.No.	Land Owner Name	Land Kitta No.	Area in Kattha	Land Location	Residence Address
		1216	1.25	Bishrampur-9, Bara	
32	Nakchhed Pandit Kumhar	480	0.60	Bishrampur-9, Bara	Nagwa, Birgunj-19
33	Laxmi Raut Kurmi	92	5	Itiyahi-7, Bara	Nagwa, Birgunj-19
34	Ramjeet Raut Ahir	94	9	Itiyahi-7, Bara	Nagwa, Birgunj-19
		97	5	Itiyahi-7, Bara	
35	Bhola Prasad Barai	1003	2.5	Bishrampur-9, Bara	Nagwa, Birgunj-19
36	Babu Lal Prasad Barai		0.85	Bishrampur-9, Bara	Nagwa, Birgunj-19
37	Som Prasad Chaurasiya		0.85	Bishrampur-9, Bara	Nagwa, Birgunj-19
38	Raj Dev Prasad Barai		0.80	Bishrampur-9, Bara	Nagwa, Birgunj-19
39	Durpati Barain	1650	2.75	Bishrampur-9, Bara	Nagwa, Birgunj-19
		550	6	Itiyahi-7, Bara	
40	Jangi Raut kurmi	99	4.50	Itiyahi-7, Bara	Nagwa, Birgunj-19
41	Rup Narayan Mahto Kushwaha	98	14	Bishrampur-9, Bara	Nagwa, Birgunj-19
42	Shubh Narayan Prasad	619	3.25	Bishrampur-9, Bara	Nagwa, Birgunj-19
43	Baijnath Prasad Barai	1649	2.75	Bishrampur-9, Bara	Nagwa, Birgunj-19
		549	6	Itiyahi-7, Bara	
44	Bijay Chaurasiya	97	1	Itiyahi-7, Bara	Nagwa, Birgunj-19
45	JayRam Prasad Barai	248	0.80	Itiyahi-7, Bara	Nagwa, Birgunj-19
		891	0.90	Bishrampur-9, Bara	
46	Jagdish Raut Barai	88	1.60	Bishrampur-9, Bara	Nagwa, Birgunj-19
47	Chanraman Raut Barai	95	5.50	Bishrampur-9, Bara	Nagwa, Birgunj-19
48	Taramati Yadav	87	1.60	Bishrampur-9, Bara	Birgunj-18
40	Taramati Barai	89	2.42	Bishrampur-9, Bara	Birgunj-18
50	Prati	82	1.50	Bishrampur-9, Bara	Nagwa, Birgunj-19
51	Madan Raj, including Munna	677	4.0	Bishrampur-9, Bara	Nagwa, Birgunj-19
		679	5.17		
		681	1.0		
		683	1.25		
		107	19.0		
		106	0.75		
		108	1.75		
		109	2.50		
52	Jagadish Raut Ahir	84	1.60	Bishrampur-9, Bara	Nagwa, Birgunj-19

(Source: Birgunj Municipality)

(b) Population Composition and Sex

The total households and population of the Displaced person available during survey in Sanitary Landfill Site areas are 41 and 234 respectively. The sex ratio of the total population is found to be 108 female and 126 male. The number of male is higher (53.85%) compared to the female population (46.15%). The average size of the household is 5.71. The details are presented in Table below.

Distribution of Population by Sex.

S.No.	VDC	Ward	HHs	Female	Male	Total Population	Average HH Size
1	Land Fill Site, Itiyahi & Bishrampur	Itiyahi-7 & Bishrampur -9	41	108	126	234	5.71

Source: Field Survey, May 2013

(c) Ethnicity Composition

The major ethnic/caste group currently living who were available during survey within the Sanitary Landfill site area is as given in Table below.

Major ethnic/caste

Caste/Ethnicity	Sanitary Landfill Site, Itiyahi and Bishrampur	
NFDIN Category	**HH**	**Pop^n**
Brahmin	0	0
Chhetri	0	0
Aadibasi Janjati	0	0
Dalit	3	17
Other Backward Caste	38	217
Total	**41**	**234**

Source: Field Survey, May 2013

The distribution caste/ethnicity groups have been designated in various order based on NFDIN category. According to NFDIN, Brahaman and Chhetri group are found nil. Similarly no indigenous group is found under Aadibasi Janjatis category. Dhobi and Dusadh under the Tarai Dalit is found 3. In the similar way Ahir, Kurmi, Kumhar, Teli, Kalwar, Sonar, Koiri, Kanu, Hajam, Baniya are kept under Other Backward group.

(d) Educational Status

Out of the total population about 43.84% are illiterate. The resettlement survey revealed that about 28.77% have completed primary level study, about 23.28% have completed the high school level study and about 4.0% have entered the college level education. There were 2 absentee HH in Land fill site at Itiyahi/Bishrampur. *(Source: Field Survey, Secondary Town Integrated Urban Environmental Improvement Project May 2013)*

(e) Occupation

The major and primary source of income of most of the HHs of the affected area is trade/business. The maximum about 14.96% household families are dependent on this primary source which is a considerable number. The people engaged in the agriculture profession are about 14.96% which seems to be surprising in the context of project area. The third highest source of income is the employment to government and private sector which is about 2.56% household families. A considerable number of young people from the affected project area are also engaged in foreign employment in Gulf countries. About 5.56% of the total population is engaged in waged labour. Apart from this, 21.79% people are found engaged in household chores. Similarly, 38.89% people is found student and studying in different school and colleges. *(Source: Field Survey, Secondary Town Integrated Urban Environmental Improvement Project May 2013)*

(f) Debt

During the resettlement survey, all the respondents were asked about their existing debt. The survey data reveals that majority of the households about 53.65% family members have

debt and the remaining 46.35% households do not have any debt. Out of the total households, who have the debt, about 60.87% have borrowed the loan from the Bank. Likewise, 13.04% have borrowed the loan from the Cooperatives and about 21.74% households have borrowed money from the relatives on 0 % interest. *(Source: Field Survey, Secondary Town Integrated Urban Environmental Improvement Project May 2013)*

(g) Level of Income by Status

The survey data reveals that out of 41 displaced HHs, entire 100% of HHs are having monthly income more than Rs. 30,000 per month. The ranges between below 5000, 5000 to 10,000, 10,000 to 20,000 and 20,000 to 30,000 is found nil. The average monthly household income of the project areas is found to be 43.944.22 at land fill site at Bishrampur and Itiyahi. The project area seems to be of urban nature, the percentage of people engaged in agriculture profession is found small compared to another profession. Most of the people are found engaged either in trade business or in service or foreign employment. So the average income level of family is quite satisfactory. *(Source: Field Survey, Secondary Town Integrated Urban Environmental Improvement Project May 2013)*

(h) Women Status

From the survey analysis it was found that in the affected area women are mainly responsible for the domestic work like fetching water, cooking, cleaning works (like house, cloths, utensils etc) and child care. But in case of some nuclear family, male were also found involved in fetching of water, cooking and cleaning works. But the situation is just reverse in the case of traditional joint families, where male dominance is prominent. *(Source: Field Survey, Secondary Town Integrated Urban Environmental Improvement Project May 2013)*

6. ENVIRONMENTAL IMPACT AND MITIGATION

Identification and prediction of environmental impacts have been made for the proposed actions/activities of the Project during the construction and operation stages of the Project. Both beneficial and adverse impacts are analyzed.

Potential environmental impacts on Physical and Chemical, Biological and Socio-economic and cultural aspects are identified and predicted based on the existing environmental condition with respect to the proposed project interventions in terms of **type of impact** (direct/indirect), their **magnitude** (low/moderate/high), **duration** (short term/ medium term/long term), and **extent** (site specific/local/regional/global).

6.1 Beneficial Impact

The direct benefit from the sub-project will be for Birgunj Municipality whose solid waste will be disposed off for 15 years. Thereafter the site will be developed as a recreational facility depending upon the view of the local people. During the preparation of the landfill site, infrastructural facilities such as roads, electricity, telecommunication facilities will be established in the sub-project area which can be extended to the sub-project area vicinity. Apart from these benefits, the sub-project will provide employment opportunity during construction and operation stages.

Beneficial impacts due to the implementation of the proposal during construction and operation phases have been assessed and further enhancement measures are suggested. Local potential areas have been identified that can be promoted to enhance the local economy. They are related mainly to improving the livelihoods of the local / poor people. The likely beneficial impacts envisaged during construction and operation stages of the Proposal are as described below.

6.1.1 Beneficial Impact - Construction Stage

Likely beneficial impacts of the sub-project during construction stage are:

(i) Employment Opportunities to Local People

Benefit

Large number of skilled, semi-skilled and unskilled manpower will be required during the construction of the sub-project. Public consultation during scoping revealed that people expects employment opportunity from the project, whether it is skilled/unskilled labour or administrative section. However, these will be considered and priority will be given to the local people depending upon their qualification and availability. The employment opportunity will increase the income level of the local people. Local people will generate substantial incomes from unskilled and semi-skilled jobs. The amount of money that is injected in the urban economy in the form of wage earnings will directly enhance the initiation of various ancillary economic activities and enterprise development. The impact is thus direct, of high significance, local but short term in nature. If the earned wage income is saved and utilized for micro-enterprises, benefits can be for long term duration.

Enhancement Measures

The project will render first priority to the local people who wish to work in the sub-project. The project will maintain the roster of local people and will offer employment based on his/her skill. The employment will increase the income level of that family. The project will provide necessary training, if required, depending upon the nature of the work offered.

A binding clause will be included in the contractor's agreement to give first priority to the local people while hiring both skilled and unskilled labor forces and will ensure to give daily wages or monthly wages equal to the official district rates. The project information will be disseminated through pamphlets and other printed materials regularly.

(ii) Technical Skills and Know-how

Benefit

During the implementation of the sub-project works, the local laborers will receive manifold skill training in construction techniques, small engineering structures, bio-engineering works, operation of heavy equipments, spoil handling, laying of horizontal liners etc. They also will receive additional knowledge in waste management, material handling, composting and general application of environmental health and social precautionary measures. The training program is being rendered under the project through the involvement of separate NGO with the cost being borne by the sub-project. The impact is direct, of high significance, local and long term in nature.

Enhancement Measures

The sub-project will give first priority to the local people while rendering training program. The training program to enhance their skill in various construction related work will augment their capacity and the local people involved in the sub-project will find it easier to find skilled manpower jobs in the future, that ensures their livelihood as an alternative/additional occupation to agriculture.

(iii) Local Economy

Benefit

With the implementation of the sub-project, there will be increase in economic activities such as business, rental of houses etc. Marketing the local products to the sub-project employees and the construction workers will increase income of the local people. Furthermore, construction workers and project staffs will have good purchasing power, and increases in consumption of local products will likely improve the local economy. It will also result to the flow of significant amount of cash into the local economy and additional income generation opportunities will be opened.

The impact will be indirect in nature and the magnitude, extent and duration of the impacts will be high, local and short-term respectively.

Enhancement Measures

The project will designate certain places, within the project area, for the operation of tea stalls and grocery shops to sell local products such as vegetables, rice, pulses, eggs, milks, ghee, chicken, mutton etc. to the extent possible. The project through its NGO will render training to local farmers and traders willing to enhance skills in modern techniques of cash crop and livestock productions and in enterprises development activities suitable to fulfill likely demands from the work force. The sub-project will encourage its staff and construction workers to purchase local products in order to uplift the economic condition of local farmers.

(iv) Local Development Activities

Benefit

The proposed sub-project area is located in the rural area just outskirt of urban settings. The existing access road from Nagwa, ward 19 of Birgunj Municipality is earthen providing poor mobility. The infrastructure development considered under the project design cost includes provisions such as upgrading of existing road to bituminous standard and extension of electricity will provide smooth mobility and benefit to the nearby settlements.

As per the demand of the local people, the sub-project has provisioned NRs. **4,000,000 (four million)** for the construction of well managed cemetery nearby proposed landfill site and contribution to the local schools, temples for its development. The contribution to school will cover supply of black boards, chalks, Duster, sports materials, improvement of playground etc. The Birgunj Municipality will finalize the location for the construction of cemetery and select the schools requiring development assistance. The magnitude, extent and duration of the beneficial impact is predicted as high, regional and long-term respectively.

Enhancement Measures

The support for the development activities will ensure its sustainability arrangement.

6.1.2 Beneficial Impact - Operation Stage

Likely beneficial impacts of the sub-project during operation stage are:

(i) Employment Generation to Local People

Benefit

Upon completion of the construction work, the sub-project will definitely require some permanent posts for the smooth operation and regular maintenance of the sub-project. Local people will be given preference during recruitment of necessary personnel for administrative and technical works according to their qualifications and skills. These will give permanent income source to some of the local people. The number of posts required could be quantified during onset of operation phase. However, the required numbers will not be big.

During operation stage, environmental impacts would be of indirect nature. The magnitude, extent and duration of the impacts will be low, local and long-term respectively.

Enhancement Measures

Employment opportunity will be provided to the local people.

(ii) Developed Infrastructure for Solid Waste Disposal

The sub-project will provide solid wastes disposal facilities for the Birgunj Municipality for around estimated 15 years. The total capacity of the landfill site is around 0.78 million m^3. The developed infrastructure will facilitate in sanitary disposal of solid wastes which will reduce environmental risk associated with health hazard and improve environment, health and hygiene of the people as compared to the present haphazard dumping of solid waste in low land area and ponds. The sub-project will enhance the efficiency in collection and transportation of wastes which will avoid littering of waste and will help in keeping the city environment clean.

Aside from landfill cells area for the deposition of residual wastes in a properly engineered manner, the sub-project provisions composting center where bio-degradable waste will be separated, shredded, place them into windrow compost piles, transfer to compost maturation bins, post-harvest screening/packaging, and final storage and sale of compost product to farmers. Waste resource processing center will also manage recyclable waste for storage and linking the products after light processing with buyers, consolidators and junk shops. With this activity, the Municipality will generate permanent income source during operation stage.

As per the demand of the local people, the Municipality has been recommended to make an arrangement for sale of compost product in a cheaper rate to the local farmers residing in nearby villages who are indirectly affected by the sub-project development.

This will be the direct impact at regional level. The magnitude, extent and duration of the impacts will be high, regional and long-term respectively.

Enhancement Measures

The lifespan of the disposal site has been estimated in consideration of the proposed "after waste reduction" at community and municipal level through community composting, waste processing. The compost prepared from solid wastes is quite popular in the kitchen gardens and the process of recycling of the waste will yield reusable materials as well as provide employment and business opportunities to many people.

The local farmers will receive compost product in a cheaper rate from the sub-project which will enhance their farming works.

(iii) Reclamation of Landfill Site

Upon saturation of the landfill site, it has been planned to develop the site as the recreation ground which could be used by the local communities as well as people from Birgunj and Kalaiya. This benefit is expected to come after quite some time. However, once the site is fully developed for the recreation purpose it could remain in service for a very long period if properly maintained and operated. The magnitude, extent and duration of this benefit will be medium, local and long term respectively.

The cost of developing the landfill site into a recreation park or play ground will be part of project cost.

(iv) Local Development Activities

Benefit

The support from BSMC and GoN will be continued for the development of the local area during operation phase also. As a reflection of the current political environment, the local people have been using the landfill site as a fulcrum to bargain for fulfillment of their demands. There have been a number of incidents of obstructing the disposal of waste by local people for reasons not necessarily related to the waste disposal. The magnitude, extent and duration of the benefit will be high, regional and long term.

Enhancement Measures

The available budget shall be spent on plans and programs. Allocation of fund from the government for local development activities is at the discretion of the government authority. Since the local community has accepted waste of the people from the Birgunj Municipality, they have the right to get compensation for their gesture. Hence it is proposed that the community should get the development fund through the incoming waste in the landfill site rather than depending on the discretion of Government authority. Assuming nominal tipping fee per ton of waste could be used for the operation of the landfill site as well as for the development activities of the local affected area.

6.1.3 Corporate Social Responsibility (CSR)

The direct benefit from the sub-project will be for Birgunj Municipality whose solid waste will be disposed off for 15 years. Thereafter the site will be developed as a recreational facility depending upon the view of the local people. During the preparation of the landfill site, local people from Ward 7 of Itiyahi and Ward 9 of Bishrampur VDC of Bara District and project affected people mostly residence of Nagwa 19 of Birgunj Municipality whose land has been acquired will be benefited with the establishment of infrastructural facilities such as roads, electricity, telecommunication facilities by the Project. The Project has also introduced various enhancement activities as per the demand of the local people/stakeholders raised during Public Hearing Meeting conducted on December 21, 2013 at Shree Nepal Rastriya Madhyamik Vidhyalaya, Nagwa, Ward No. 19, Birgunj, Parsa. The enhancement activities proposed are summarized as follows.

- The project will render first priority to the local people who wish to work in the sub-project. The project will maintain the roster of local people and will offer employment based on his/her skill.
- The sub-project will give first priority to the local people while rendering training program to enhance their skill in various construction related work that will augment their capacity that will ease them to find skilled manpower job in the future. This will ensure their livelihood as an alternative/additional occupation to agriculture.
- The project through its NGO will render training to local farmers and traders willing to enhance skills in modern techniques of cash crop and livestock productions and in enterprises development activities suitable to fulfill likely demand from the work force.

The sub-project will encourage its staff and construction workers to purchase local products in order to uplift the economic condition of local farmers.

- As per the demand of the local people, the sub-project has provisioned NRs. Four Million for the construction of well managed cemetery nearby proposed landfill site and contribution to local schools, temples for its enhancement/renovation. The contribution to schools will cover supply of black boards, chalks, duster, sports materials, improvement of playground etc.
- The life span of the disposal site has been estimated in consideration of the proposed "after waste reduction" at community and municipal level through community composting, waste processing. The compost prepared from solid wastes is quite popular in the kitchen gardens and the process of recycling of the waste will yield reusable materials as well as provide employment and business opportunities to many people. The local farmers will receive compost product in a cheaper rate from the sub-project which will enhance their farming works.
- Since the local community has accepted waste of the people from the Birgunj Municipality, they have the right to get compensation for their gesture. Hence it is proposed that the community should get the development fund through the incoming waste in the landfill site rather than depending on the discretion of Government authority. Assuming nominal tipping fee per ton of waste could be used for the operation of the landfill site as well as for the development activities of the local affected area.

6.2 Adverse Impacts and Mitigation Measures

The sub-project activities during construction and operation may create a number of adverse impacts on physical, biological and socio-economic and cultural environment as identified in the approved scoping and Terms of Reference. In order to keep the study as per its ToR, impact on each issue has been identified, predicted and evaluated in the following sub-sections.

6.2.1 Physical Environment

6.2.1.1 Construction Stage – Physical Environment

(i) Landscape Disturbance

Impact

The land to be covered by the proposed landfill site area constitutes paddy field owned by the Birgunj Municipality. The construction of infrastructures for the sub-project will change the land use pattern of the area but will not affect much as the land is already owned by the Municipality. The magnitude, extent and duration of this impact will be low, site-specific and short-term respectively.

Mitigation Measures

The project will do all the necessary needs to minimize disturbance to the surrounding area and all natural drainage channels has been guided to give continuity towards its natural flow so that no measure alteration in the natural drainage channels take place. *The cost for the mitigation measures is included in the construction contract.*

(ii) Land Stability and Soil Erosion

Impact

The proposed site is a plain terrain of terai area where Singaha river flows from its western border. At present, the river bank of the project area is not disturbed. However, during construction, the river bank slope may get disturbed inviting land instability and soil erosion problem. The magnitude, extent and duration of this impact will be low, site-specific and short-term respectively.

Mitigation Measures

The design drawings includes well planned drainage channels and blacktopped roads all around including concrete pavement over parking and vehicle wash/maintenance area. The river banks are provisioned with bank protection works with gabion walls and gabion mattress. All the embanked slopes (40,000 m^2) are provisioned in the design with broadcasting of grass seeds with seeding rate 25 gm/m^2. *The cost for the mitigation measures is included in the construction contract.*

(iii) Air Quality, Water Quality and Noise Level

Impacts

The earthworks in excavation for site development, various wastewater stabilization ponds, trench excavation for proposed structures and earthwork filling in development of earthen embanked waste storage dam, road sub-grade preparation, structural fills, laying of sub-base, base, bituminous surfacing and plying of vehicles within the sub-project area for the transportation of construction materials from the quarry site to the construction site and movement of consultant's and contractor's personnel on daily basis will add emission of air pollutant in the local atmosphere. This could impose risk of health and safety hazard to workers and nearby resident from dust and other accidents. Similarly the construction activities will take place near the Singaha river. The construction waste are likely to enter the Singaha river. This could change the river water quality of Singaha river. The construction activities such as operation of heavy equipments will increase the noise level at the site. These changes in the natural environment are normal in any construction projects. Hence, it is not significant impact as such. The magnitude, extent and duration of this impact will be low, site-specific and short-term respectively.

Mitigation Measures

Noise Level - Although noise level increase has been evaluated as insignificant, the project will make effort to reduce the noise level during its construction period. The mitigation measures for maintaining noise level are as follows:

- Consult with the local community to inform them of the nature, duration and likely effects of the construction work, and to identify any local concerns so that these can be addressed.
- Avoid noise generating activities at night.
- Minimization of the period of construction.
- Noise barriers to be placed at appropriate location.
- Noise producing engines will be fitted with noise reducing equipment.

- All vehicles plying in the construction area will be maintained regularly as per the manufacturer's recommendations.

The cost for mitigation measures is included in construction contract.

Air Quality – In order to minimize possible changes in air quality, the following mitigation measures will be implemented.

- Reduce dust by spraying water on stockpiled soil, excavated materials, and spoils.
- Construction area and access road to the site shall be maintained damp by periodical spray of water.
- Cover stockpiled construction materials with tarpaulin.
- Ensure delivery vehicles be covered.
- Enforce construction contractor to produce and implement a site Health and Safety (H&S) Plan that includes: (a) excluding the public from the site, (b) ensure that all workers are provided with and use appropriate personal protective equipment, (c) H&S training for all site personnel, (d) documented procedures to be followed for all site activities, and (e) documentation of work-related accidents.
- The Contractor will implement safety measures against accident risks.
- All construction vehicles will comply with Motor Vehicles and Transportation Management Act as amended.
- Ensure use of vehicles complying with NVMES 2069 BS.

The cost for mitigation measures is included in construction contract.

Water Quality – For the minimization of surface water quality during construction, the following mitigation measures will be implemented.

- Surface and ground water reserves will be protected from any source of contamination such as construction and oily waste that will degrade its potable quality.
- Solid wastes shall be disposed off in designated sites and covered so that scattering of waste by rodents and birds will be avoided.
- Ensure that the construction debris do not find their way into the drainage or irrigation canals which may get clogged.
- Prohibit washing of machinery and vehicles in surface waters, provide sealed washing basins and collect wastewater in sedimentation/retention pond.
- Contractor needs to arrange for sufficient water supplies and proper sanitation facilities for its labor force.
- Regular water quality monitoring (physic-chemical and microbiological tests) according to determined sampling schedule.

The cost for mitigation measures is included in construction contract. However, the estimated cost for water quality monitoring provisioned during construction phase is ***NRs. 1,260,000*** *(3 sites x 12 times x 35,000).*

(iv) Operation and Closure of Quarries and Borrow Pits

Impact

The sub-project work will require significant quantities of construction materials such as clay, embankment fill material, sand, aggregates, gravel, and chippings etc., which are supposed

to be brought from approved quarry and borrow pit sites. Extraction activity could disrupt natural land contour, additional land degradation due to excessive quarrying inviting land disputes, soil erosion, loss of potential cropland, loss of vegetation, scouring of river beds etc. The magnitude of the impact will be medium, extent site-specific and the duration short term.

Mitigation Measures

The following mitigation measures will be enforced to minimize impact against operation of quarries and borrow pits.

- Locate and peg quarries and seek approval from the supervising consultant.
- Obtain permission/license for extraction of materials from stakeholders, Municipality, DDC or VDC as appropriate.
- Locate extraction sites restricted to small areas, preferably on existing quarry sites and sites without any tree cover, away from dwellings, archeological, religious or cultural sites, sites which will not alter river flow regime and possess water logging problem in future, and sites where effects will be temporary.
- Prevent ponding of water through adequate drainage.
- The depth of the pits should be regulated so that the sides of the excavation will have a slope not steeper than 1:4.
- Stripped materials shall be stored so as not to disrupt natural drainage and shall be protected so as not to be eroded into surface waters.
- Restore the site maintaining natural contours and vegetation.

This will be a part of the civil works and the cost for mitigation measures is included in the construction contract.

(v) Drainage Alteration and Associated Erosion and Sediment

Impact

The construction activities are likely to make temporary drainage alteration resulting soil erosion and sediment transport in the river. Since, the sub-project area is confined to a small plain area, such an alteration will be low in magnitude. It will be site specific in location and short term in duration.

Mitigation Measures

The project will do all the necessary needs to minimize disturbance to the surrounding area and all natural drainage channels has been guided to give continuity towards its natural flow so that no measure alteration in the natural drainage channels take place. The design drawings includes well planned drainage channels within the sub-project area draining it to Singaha river. As demanded by the locals, the project will initiate building new bridge over Singaha river in place of existing poorly maintained six meter span bridge along the access leading to landfill site. The proposed canal road has been designed with adequate drainage channel. *The cost for the mitigation measures for drainage channel and bridge construction is included in the construction contract.*

(vi) Leakage of Oil, Grease and other Materials

Impact

Number of light and heavy vehicles will be required for the construction of the sub-project. These vehicles will use diesel and petrol, engine oil, gear oil, brake oil etc. The labor housing would require large volume of kerosene for cooking purpose.

The possibility of leakage of oil and grease and other liquid materials cannot be overruled. The oil if spilled will easily spread over the ground and produce eye sore. The oil spill pollutes the water surface and the dissolved oxygen content of the stream water might be reduced. The oil leakage would have detrimental impact on the aquatic life. The sub-project involves bituminous works for road surfacing where release of Bitumen into environment and runoff of bitumen into surface water is inevitable. Fuel wood may be burned for heating bitumen.

Taking note of the limited presence of aquatic species, and use of stream water, environmental impact will be low in magnitude, the extent is site-specific and duration is short-term.

Mitigation Measures

The following mitigation measures will be implemented to minimize leakage hazard.

- Construct double berms of concrete around the oil and grease holding structures.
- Fuel wood shall not be used for heating bitumen. Bitumen shall be melted in heaters using kerosene, diesel or gas fuel.
- Petroleum products will be stored in dedicated areas, not scattered along the road and any small accidental spills will be cleared up immediately.
- No petroleum products will be discharged into side drains.

The cost for the mitigation measures is included in the construction contract.

(vii) Labor Camp and Solid Waste Disposal Generated by the Construction Workers

Impact

It is estimated that around 150 numbers of workforce will be required during peak period of construction. Around 53 kg of solid waste per day is likely to be produced by the workforce. Pollution of surface and ground water is likely from unsanitary waste disposal practices and could create social conflicts. The magnitude, extent and duration of this impact will be moderate, site-specific and short-term respectively.

Mitigation Measures

The following mitigation measures will be implemented in order to minimize impact due to solid waste disposal generated by the construction workers.

- Locate, peg and seek approval from Supervising Consultant for labor camp sites.

- Camps shall not be located near settlements; near water supply intakes; or sites that affects locals access to drinking water.
- Camp shall not be in the vicinity of landslide and flood plains.
- Provide and maintain proper drinking water, sewerage and waste disposal facilities at the camps.
- The solid waste generated will be separated. Non-degradable waste as plastic, steel, glasses etc. will be recycled while bio-degradable waste will be collected and dumped at proper location approved by Design and Supervision Consultant/Municipality with consent of relevant stakeholders. Open burning of solid waste will be strictly banned during construction. Management of solid waste will be undertaken as per SWMA 2068 BS.
- The solid waste will be disposed off at designated location and will be covered by clay material in order to avoid scattering of waste by rodents and birds.
- Ensure no wood is burnt by any worker on or off site. Camps shall be provided free of cost, with electricity and regulator & adequate fuel supplies of LPG or Kerosene.
- Prohibit workforce from poaching wildlife and cutting trees.
- After use, sites shall be cleared and restored to near natural or stable conditions with vegetative cover.
- Restrict working hours from 7:00 to 18:00.
- The Contractor shall not employ child or under aged person as per Labour Act, BS 2048.

The cost for the mitigation measures is included in the construction contract.

(viii) Stockpiling of Construction Materials and Spoil Disposal

Impact

Construction materials if not stored properly will lead to siltation and pollution of water bodies. Haphazard spoil disposal could cause smothering of vegetative cover triggering erosion, siltation, pollution, destruction of private property, crops, land, and irrigation systems. The magnitude, extent and duration of this impact will be moderate, site-specific and short-term respectively.

Mitigation Measures

The following mitigation measures will be implemented in order to minimize impact due to stockpiling of construction materials and spoil disposal.

- Locate, peg and seek approval from the supervising consultant for the use of stockpile sites.
- Stockpile should not be located on water courses; should not be within 50m of schools, hospitals or public standpipes; and should not affect locals and their properties.
- Obtain written permission from landowners and local bodies for stockpiling on their land.
- Stockpiles should be covered with tarpaulins. For large stockpiles, it should be enclosed with side barriers and also covered when not in use.
- Provide intervening vegetated buffer to control any un-expected run-off.
- Clean area properly after completion.
- Locate disposal sites on stable ground without excessive slope; that avoids water courses and wetlands; that will not promote instability and result in destruction of

property, vegetation and local services. Preferably permissible sites are abandoned quarry or borrow pit in order to restore original contour.
- Restrict disposal at approved locations with correct placement of fill.

The cost for the mitigation measures is included in the construction contract.

(ix) Loss of Top Soil

Impact

During site clearance, top soil will need to be removed which will propagate habitat degradation, species loss, siltation in water courses, and downstream water quality deterioration. The magnitude, extent and duration of this impact will be moderate, site-specific and short-term respectively.

Mitigation Measures

The following mitigation measures will be implemented in order to minimize the impact.

- Mark out extent of clearing within approved worksite areas.
- Restrict clearing to the marked areas and not to harvest any forest products for personal consumption or sale.
- Stockpile cleared shrub foliage where possible at designated location for later use as brush layer.
- Protect remaining vegetation within the proposed site.
- Renewal of natural resources (i.e. seed sowing).

The cost for the mitigation measures is included in the construction contract.

Table 6.1: Summary of Impact Matrix- Physical Environment (Construction Stage)

Issues	Likely Impacts	Direct/ Indirect	Magnitude	Extent	Duration
Landscape Disturbance	• Change in landuse pattern	D	L	Site - specific	Short - term
Land Stability and Soil Erosion	• River bank slope may get disturbed due to excavation. Exposed cut slopes and embanked slopes to rain and wind could cause soil erosion and siltation. • Risks of temporary silt runoff due to disposal of excavated soil.	D	L	Site - specific	Short - term
Air Quality, Water Quality and Noise Level	• Risk of health and safety hazard to workers and nearby residents from dust and other accidents. • Deterioration of air quality and increase in dust/suspended particulate matter. • Effect on adjoining water bodies from construction activities. • Surface water might get contaminated due to the disposal	D	L	Site - specific	Short - term

Issues	Likely Impacts	Direct/ Indirect	Magnitude	Extent	Duration
	of construction waste generation. • Nuisance to public due to increased noise levels during construction.				
Operation of Quarries and Borrow Pits	• The project work will require construction materials as sand, aggregates, gravel, suitable material, chippings etc. which are supposed to be brought from approved quarry sites. Extraction activity could disrupt natural land cotour, additional land degradation due to excessive quarrying. • Disruption of natural land contour, land disputes, soil erosion, loss of potential cropland, loss of vegetation, scouring of river beds etc. • Ponding, water logging, and water pollution.	D	M	Site - specific	Short - term
Drainage Alteration and Associated Erosion and Sediment	• Soil erosion • Sediment transport in the river	D	L	Site - specific	Short - term
Leakage of Oil, Grease and other Materials	• Fire and explosion hazard • Pollution of water surface • Fuel wood may be burned for heating bitumen	D	L	Site - specific	Short - term
Solid Waste Disposal Generated by the Construction Workers	• Pollution of surface and ground waters from unsanitary waste disposal practices. • Social conflicts.	D	M	Site - specific	Short - term
Stockpiling of Construction Materials and Spoil Disposal	• Construction materials if not stored properly will lead to siltation and pollution. • Disturbance to private property. • Haphazard spoil disposal could cause smothering of vegetative cover triggering erosion, siltation, pollution, destruction of private property, crops, land irrigation systems.	D	M	Site - specific	Short – term
Loss of Top Soil	• habitat degradation • species loss • siltation in water courses • downstream water quality deterioration	D	M	Site - Specific	Short - term

Note:

D = Direct Impacts I = Indirect Impacts L = Low Impacts

M = Moderate Impacts H = High Impacts

6.2.1.2 Operation Stage – Physical Environment

(i) Land Stability and Soil Erosion

The project will not be disturbing the river banks of the sub-project area during operation stage of proposed landfill site. The sub-project has made provision to develop buffer area/strip all around the landfill site and carry out plantation in it. This will improve the land stability of the project area vicinity. This will not only bar in viewing land filling operation from outside but also check soil erosion. *Mitigation cost is provisioned as sub-project operation and maintenance cost.*

(ii) Surface Water Hydrology

Impact

The Singaha river if not properly controlled, the river banks could get eroded affecting the sub-project area. The magnitude of the impact will be high, extent will be site specific and duration will be long term.

Mitigation Measures

River training works is one of the important component of the sub-project. The sub-project will initiate construction of new bridge over Singaha river down stream of the landfill site so as to maintain smooth flow of the river channel. Further, the design includes appropriate drainage channels along the proposed canal road to guide the surface runoffs. *Mitigation cost is provisioned in the design including sub-project operation and maintenance cost.*

(iii) Air Quality

Impact

Movement of the waste carrying vehicles within the landfill site and waste disposal activities will deteriorate the air quality of the area and at the same time the gas emitted from the landfill site would further deteriorate the air quality. This impact is inevitable. Hence the magnitude of the impact is considered high, the duration is long-term and extent is beyond the site (i.e. local).

Mitigation Measures

Provision has been made for the waste carrying vehicles to be covered properly to avoid littering of the waste. All the roads and working area within the landfill will be bituminous/concrete paved so that dust emission is minimized. Vehicles moving out will be properly washed. The workers within the landfill site will be provided with masks. *Mitigation cost is provisioned as sub-project operation and maintenance cost.*

(iv) Leachate Generation and Risk on Water Quality (surface and ground water)

Impact

The proposed landfill site will generated highly concentrated leachate. If the surface runoff of the landfill site or any other water sources is allowed to enter in the landfill site, the quantity of the leachate will increase. In addition, the quantity of leachate will increase during the rainy season. The leachate could contaminate the surface and ground water if they are

allowed to pass into them. The magnitude of the impact is considered high, the duration is long-term and extent is beyond the site (i.e. local).

Mitigation Measures

The detailed design has considered these aspects and taken care of it. Horizontal and vertical lining have been proposed in the design. The design makes sure that the leachate does not get access to the surface and ground water. They are safely collected via perforated pipes and treated prior to disposal. All the generated leachate will be treated through stabilization ponds (i.e. anaerobic, facultative and maturation ponds). Effective implementation of these provisions will be made.

The estimated cost for water quality monitoring (1 treated leachate effluent, 2 ground water and 2 surface water) provisioned during operation phase is ***NRs. 2,100,000*** *(5 sites x 12 times x 35,000). The estimated cost is for one years of operation phase during defects liability period. However the water quality monitoring shall be carried out regularly during the life of the landfill site and beyond.*

(v) Noise and Vibration

Impact

Number of waste collection vehicle will be running in the sub-project area and equipments such as excavator, compactor and dozers will also be plying in the landfill site. Movement of these vehicles and equipments will generate some noise and vibration during operation of the landfill site. However, magnitude of the impact will be comparatively low, the extent of the impact will be site specific and the duration will be long term as long as the sub-project is in operation.

Mitigation Measures

All the vehicles and equipment will be kept in good condition. Regular servicing of the vehicles and equipments will be carried out. The workers will be provided with safety gadgets such as ear plugs, gloves, mouth mask, helmets and boots. The maintenance of the vehicles and equipments will be part of the operation plan of the landfill site. *Mitigation cost is provisioned as sub-project operation and maintenance cost.*

(vi) Bad Smell

Impact

Bad smell is one of the characteristic of solid wastes. This is particularly true in case of the solid wastes with higher percentage of biodegradable materials. As the waste gets old, it smells bad. Sometimes the collection of waste in the cities is delayed due to various reasons. On such occasions the waste remains dumped on streets or roads for quite some time. Ultimately when they are transported to the landfill site they would be in the decomposition stage. When such waste are mixed and shuffled, it produces very bad smell which would extend to a larger distance than normal.

In addition to this, the leachate collected and treatment process in stabilization ponds gives bad smell to some extent. However, the smell will not be as bad as the shuffling of old waste. The magnitude of impact will be high, the duration long-term and the extent beyond the site (i.e. local).

Mitigation Measures

The solid waste will be brought into the landfill site as early in the day as possible without undue delay covered properly in the waste carrying vehicle. The shuffling of waste will be carried out when the wind blow is less. All the staff working in the landfill site will be provided with quality mouth mask. Buffer area/strip all around the landfill site and daily cover of disposed waste with clay liner has been proposed to prevent the foul smell spreading in the community. *Mitigation cost is provisioned as sub-project operation and maintenance cost.*

(vii) Gas Generation, Emission and Dispersion

Impact

The decomposition process of the solid waste will generate the methane and other gases which will be collected and released in the environment without any treatment through gas vent pipe. The methane gas is inflammable and gives foul smell. The inflammability could cause fire hazard if precautions are not taken in time. The foul smell of gas could spread around the project area vicinity. The magnitude of the impact is considered high, extent local and duration long-term.

Mitigation Measures

The landfill site will have provision of adequate number of fire extinguishers in case of the emergency and all the workers working within the landfill site will have mouth masks. Smoking will be strictly prohibited in the landfill site. The design provisions in trapping and flaring up of gases. *Mitigation cost is provisioned as sub-project design, operation and maintenance cost.*

(viii) Availability of Cover Material

Impact

The disposed waste will be covered daily by the soil. Total 11,644 m^3 of soil cover will be required for the entire period. These cover material is not available nearby the project area. It had to be brought from Ratomate, about 5km south of Hetauda and 50km north from the proposed landfill site located near Tribhuvan Rajpath. The operation of the borrow sites is likely to disturb the landscape, change in elevation level and loss of fertile topsoil and will increase the dust emission. The slopes of the borrow sites could be unstable and might invite erosion and landslide.

The magnitude of the impacts will be low, extent site-specific and duration medium-term.

Mitigation Measures

Extraction of the cover material will be planned properly. Retaining structures will be constructed where required for stable side slopes. Preferably less than 45° slope will be maintained at the borrow sites. Proper drainage will be provisioned to drain out water. *Mitigation cost is provisioned as sub-project design, operation and maintenance cost.*

(ix) Human Health Associated with Environmental Pollution

Impact

During operation stage there will be movement of project staff and workers who will be engaged in the disposal operation of waste. The vehicle and equipments such as dozer, compactor, dump trucks and excavator will be constantly in operation. Hence the occupational health and safety of the staffs and workers is of much concern. The health and safety being of major concern, magnitude of the impacts has been evaluated as high. The extent will be site-specific and duration will be long-term.

Mitigation Measures

The workforce will be made aware of the health problems that may cause due to unsafe handling of the waste. Proper way of handling of waste will be instructed. Project will ensure adequate safety measures such as provision of helmets, masks, ear plugs etc. are available in the landfill site. A medical kit with necessary emergency medicines will be made available in the landfill site. Regular and periodic medical check up will be carried out to the staffs working in the site. All the staffs will be covered by the accident insurance. *Mitigation cost is provisioned as sub-project design, operation and maintenance cost.*

(x) Impact of Environment on the Project

Impact

Though there is no settlement area near the landfill site within one to two kilometer periphery, but the settlement nearby use the access road common to landfill site leading to their residence. The local people may oppose and hinder in transportation of waste to the landfill site raising issues of bad smell and littering of waste to their locality creating unhygienic condition. This could lead in risk of disturbance from the locals. The magnitude of impact has been evaluated as high, extent site –specific and duration long-term.

Mitigation Measures

The project will ensure that all the waste carrying vehicles are properly covered and no littering of waste occurs while transportation. *Mitigation cost is provisioned as sub-project design, operation and maintenance cost.*

(xi) River Pollution and Scattering of Waste by Rodents and Birds

Impact

There is possibility of visiting landfill site by scavenger birds like vultures, crows, eagles etc. This may create hazard to the local community close to the landfill site. They carry waste materials on the roof tops of the local settlement and may contaminate surface water by scattering and dropping of waste on river water. They may even attack the poultries of the local community. There is the risk of community health and safety from odor and diseases transmitted by flies, insects, birds and rats. Since, the buffer area/strip has been created all around the landfill site the impact could be low, site specific and long term in duration.

Mitigation Measures

The project will ensure that the waste disposal, spreading and compaction operation will be carried out as soon as the wastes are unloaded. The waste will be covered daily by clay material. Special attention will be given for the waste brought in from the slaughter houses. *Mitigation cost is provisioned as sub-project design, operation and maintenance cost.*

(xii) Fire Hazard and Access Road Pollution

Impact

The decomposition process of the solid waste will generate the methane and other gases which will be collected and released in the environment without any treatment through gas vent pipe. The methane gas is inflammable and gives foul smell. The inflammability could cause fire hazard if precautions are not taken in time. The foul smell of gas could spread around the project area vicinity. While transportation waste in the landfill site, the access road could get polluted due to scattering of waste. The magnitude of the impact is considered high, extent local and duration long-term.

Mitigation Measures

The landfill site will have provision of adequate number of fire extinguishers in case of the emergency and all the workers working within the landfill site will have mouth masks. Smoking will be strictly prohibited in the landfill site. The design provisions in trapping and flaring up of gases. The project will ensure that all the waste carrying vehicles will be covered properly. *Mitigation cost is provisioned as sub-project design, operation and maintenance cost.*

6.2.2 Biological Environment

6.2.2.1 Construction Stage – Biological Environment

(i) Clearing of Vegetation

Impact

The proposed landfill site development works entails clearing of existing trees within the proposed landfill site area owned by the Birgunj Municipality with girth ranging from 0.3m to 1.8m. Most of the trees are located along the western boundary of the proposed landfill site near Singaha River. The number of trees required for felling are as follows.

S.No.	Tree Size (Girth)	Species	Numbers
1	>0.30 – 0.60m	Masala (*Eucalyptus camaldulensis),* Sisau *(dalbergia sisso)*, Sirish *(albizia sp)*, Teak *(tectona grandis)*, Biruwa, Kukath (*Indigofere atropurpurea)*, Chhatiban, Bachkarai, Mango *(magnifera indica)*, Jamun *(syzygium cumini)*, Runi, Nimbu *(azadirachta indica),* Sohajan, Gagal, Pithwa	633
2	>0.60 – 0.90m	Sirish *(albizia sp)*, Sisau *(dalbergia sisso)*, Masala (*Eucalyptus camaldulensis),*Bachkarai, Tilka, Mango *(magnifera indica),* Bel, Kathar, Runi, Gular, Bayar, Pithwa, Kadam, Simal (*Bombax ceiba var. leiocarpum),* Kukath (*Indigofere atropurpurea)*	92
3	>0.90 – 1.80m	Pithwa, Peeple *(ficus religiosa)*, Kadam *(anthocephalus chinensis),* Sisau *(dalbergia sisso)*, Mango *(magnifera indica), Bachkarai*	8

The anticipated impact is of direct, magnitude moderate, extent site specific and duration medium term.

Mitigation Measures

Tree plantation will be carried out all around the landfill site (covering 15m strip around 1,398m perimeter) for creation of buffer area/strip. Total 7,330 nos of trees will be planted which forms good compensation in the ratio of 1:10 towards likely clearance of 733 numbers of trees (though 1:2 ratio has been endorsed in the new provision). The sub-project will coordinate with the concerned authority (Municipality, VDC, DDC, District Forest Office) for proper tagging, felling, stacking and transporting logs at designated location. The estimated cost for felling (including tagging, stacking and transportation) and plantation (including management for 5 years) of trees are as detailed below.

S. No.	Description	Unit cost (NRs.)	Quantity (Nos.)	Amount (NRs.)
1	Felling of existing Trees			
	Girth >0.30 – 0.60m (Pole Class Trees)	290	633	183,570
	Girth >0.60 – 0.90m (Pole Class Trees)	1,025	92	94,300
	Girth >0.90 – 1.80m (Timber Class)	2,800	8	22,400
2	Plantation of suitable Trees	200	7,330	1,466,000
	Total			**1,766,270**

Fuel wood use shall be banned for construction works as well as for workers. Kerosene supply will be regular and easily available to the construction workers. The anticipated cost and specific conditions are included in the construction contract.

Table 6.2: Summary of Impact Matrix- Biological Environment (Construction Stage)

Issues	Likely Impacts	Direct/ Indirect	Magnitude	Extent	Duration
Clearing of Vegetation	Clearing and felling of existing trees within the proposed landfill site area with girth ranging from 0.3 to 1.8m.	D	M	Site Specific	Medium Term

Note:

D = Direct Impacts I = Indirect Impacts L = Low Impacts
M = Moderate Impacts H = High Impacts

6.2.2.2 Operation Stage – Biological Environment

(i) Birds Hazards

Impact

There is possibility of visiting landfill site by scavenger birds like vultures, crows, eagles etc. This may create hazard to the local community close to the landfill site. They carry waste materials on the roof tops of the local settlement and may contaminate surface water by scattering and dropping of waste on river water. They may even attack the poultries of the local community. There is the risk of community health and safety from odor and diseases transmitted by flies, insects, birds and rats. Since, the buffer area/strip area has been created all around the landfill site, the impact could be low, site specific and long term in duration.

Mitigation Measures

The project will ensure that the waste disposal, spreading and compaction operation will be carried out as soon as the wastes are unloaded. The waste will be covered daily by clay material. Special attention will be given for the waste brought in from the slaughter houses.

In case immediate spreading, compaction and cover by clay material of solid waste could not materialize, the waste will be ensured to be covered properly by vinyl sheets for the time being so that the waste are not carried away by scavenger birds like vultures, crows, eagles etc.

Mitigation cost is provisioned as sub-project design, operation and maintenance cost.

(ii) Aquatic Life – Water Pollution

Impact

The proposed landfill site will generate highly concentrated leachate. The leachate could contaminate the surface and ground water if they are allowed to pass into them. The magnitude of the impact is considered high, the duration is long-term and extent is beyond the site (i.e. local).

Mitigation Measures

The detailed design has considered these aspects and taken care of it. Horizontal and vertical lining have been proposed in the design. The design makes sure that the leachate does not get access to the surface and ground water. They are safely collected via perforated pipes and treated prior to disposal. All the generated leachate will be treated through stabilization ponds (i.e. anaerobic, facultative and maturation ponds). Effective implementation of these provisions will be made. *Mitigation cost is provisioned as sub-project design, operation and maintenance cost.*

6.2.3 Socio-economic and Cultural Environment

6.2.3.1 Construction Stage – Socio-economic and Cultural Environment

(i) Loss of Farmland and other Category of Lands as a Part of Site Clearance

Impact

The proposed sub-project will not have any adverse impact on loss of farmland and other category of lands as the proposed land for landfill site is owned by the Birgunj Municipality. Thus the impact has been evaluated low in terms of magnitude, site specific in terms of extent and short term in terms of duration.

Mitigation Measures

No acquisition compensation and rehabilitation is required.

(ii) Disturbance to Public/Private Utilities and Access to them

Impact

There will be no impact on development of sanitary landfill site as the site is far away from settlement areas. However, during transportation of waste, there could be impact on public/private utilities, access to them or damages due to heavy equipment/vehicular movement depending upon the methods of transportation. The magnitude of impact has been evaluated as low, extent site –specific and duration long-term.

Mitigation Measures

The sub-project will plan for immediate attendance by the service providers to any damages to utilities during construction. The sub-project will ensure keeping the site free from all unnecessary obstructions and storing of disposing of any contractor's equipment or surplus material, and clearing away and removing from the site any wreckage rubbish and temporary works which are no longer required. As per the demand of the locals during scoping, the project has designed an internal road within the landfill site which will be used for transfer of waste during operation of the site and upon completion of land filling, it will turn out to form as a periphery road for recreational park to be developed in later stage. *The cost for this is already included in design and construction contract.* In addition to this, the project will also construct a well managed cemetery near the landfill site (location to be decided by the Birgunj Municipality) as per local demand. *The cost for this has already been reflected in local development activity under beneficial impact.*

(iii) Health and Sanitation

Impact

The labor and project staffs may be exposed to high noise and dust levels during construction. Concentration of a large number of people in the project sites may create problems in disposal of sewerage and water contamination. These may increase pressure to the health services. Hence the magnitude of the impact will be high, extent site specific and duration short term.

Mitigation Measures

The workforce will be made aware of the health problems caused by unhealthy sanitation and contamination of drinking water. Proper methods of managing disposal of sewerage and checking of water contamination will be taught to the contractors and workers.

The project will establish campsite for the workers from outside of the project area and all outside workers will be housed in the campsite. The camp site will have facilities such as drinking water supply, pit latrines and health clinics along with necessary medicines to the workers and their dependants in the labor camps so that no additional pressure on the existing services and facilities will be created due to workers who come from outside the project area. One pit latrine for every 10 workers will be constructed.

The cost for the mitigation measures is included in the construction contract.

(iv) Occupational Health and Safety

Impact

In spite of precautionary measures, occurrence of serious accidents can not be completely ruled out. Construction activities and plying of vehicle in the earthen road will increase dust and gaseous emission, and respiratory diseases may threaten health of the local people and workers. Although the health and safety will be major concern during the construction stage, magnitude of the impacts has been evaluated as low since provisions of health and safety measures are mandatory in any of the construction contract. The extent will be site-specific and duration short-term.

Mitigation Measures

All construction workers and staffs will be covered with accident insurance. In order to minimize the unwanted accidents and possible effect of dust and gaseous emission to construction workers, the project will ensure adequate safety measures such as provision of helmets, masks, air plugs, road signs, warning signals etc. To minimize dust to local people, provision of water spray will be made during the dry season.

The construction site will have a provision of health clinics (as demanded by locals) along with necessary medicines for immediate treatment in case of any accidents. The workforce will be made aware of the likely occurrence of accidents during construction works and teach them precautionary measures to be taken for avoiding such accidents.

Safety measures for the local people around the area will also be carefully dealt with. *The cost for the mitigation measures is included in the construction contract.*

(v) Conflict between Local and Outsiders / Increase in Bad Habit due to Cash Flow

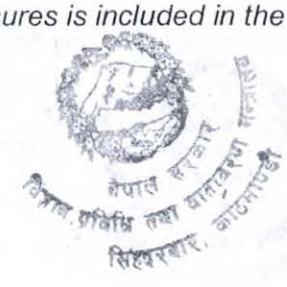
Impact

The concentration of large number of people with varied social and cultural backgrounds and inflow of cash at the same time may lead to anti-social activities such as use of more alcohol, gambling, and prostitution that may invite conflict between local and outsiders. The influx of outside workers may also disturb existing socio-cultural practices of the area. This may bring uneasiness to the local people resulting in conflicts. The conflict may deteriorate the law and order situation. The project proposes to hire local people to the extent possible limiting number of workers from outside. The magnitude of the impact is therefore considered to be low, extent local and duration short term.

Mitigation Measures

A local committee representing local political parties will be formed which will be encouraged to impose restrictions on certain activities in the social places so that the workers do not become a nuisance to local people. Regular surveillance by security people will also be managed. To develop good relationship and understandings between local community and the project people and to maintain a harmonious relationship between them a public relation officer will be employed.

The cost for the mitigation measures is included in the construction contract.



(vi) Employment for Locals

Large number of skilled, semi-skilled and unskilled manpower will be required during the construction of the sub-project. Public consultation during scoping revealed that people expects employment opportunity from the project, whether it is skilled/unskilled labour or administrative section. However, these will be considered depending upon their qualification and availability.

Upon completion of the construction work, the sub-project will definitely require some permanent posts for the smooth operation and regular maintenance of the sub-project. Local people will be given preference during recruitment of necessary personnel for administrative and technical works according to their qualifications and skills. These are considered as beneficial impact.

(vii) Cultural and Aesthetic Sites

The execution of sub-project activities will not disturb archaeological and/or religious sites of the area.

Table 6.3: Summary of Impact Matrix- Socio-economic Environment (Construction Stage)

Issues	Likely Impacts	Direct/ Indirect	Magnitude	Extent	Duration
Loss of Farmland and other Category of Lands as a Part of site Clearance	No adverse impact as the proposed land for landfill site is owned by the Birgunj Municipality.	D	L	Site Specific	Short term
Disturbance to Public/Private Utilities and Access to them	No disturbance in development of sanitary landfill. However, transportation of waste may have impact on public/private utilities, access to them or damages due to equipment/vehicular movement.	D	L	Site Specific	Short term
Health and Sanitation	Exposure of labor force to high noise and dust levels during construction. Concentration of large number of people in the project site may create problems in disposal of sewerage and water contamination. May increase pressure to health services.	D/I	H	Site Specific	Short term
Occupational Health and Safety	Construction activities and plying of vehicle in the earthen road will increase dust and gaseous emission, and respiratory diseases may threaten health of the local people and workers.	D	L	Site Specific	Short term
Conflict between Local and Outsiders / Increase in Bad Habit due to Cash Flow	• The concentration of large number of people with varied social and cultural backgrounds and inflow of cash at the same time may lead to anti-social activities such as use of more alcohol, gambling, and	I	L	Local	Short term

Issues	Likely Impacts	Direct/ Indirect	Magnitude	Extent	Duration
	prostitution that may invite conflict between local and outsiders. • The conflict may deteriorate the law and order situation.				

Note:

D = Direct Impacts I = Indirect Impacts L = Low Impacts
M = Moderate Impacts H = High Impacts

6.2.3.2 Operation Stage – Socio-economic and Cultural Environment

(i) Public Health, Health and Sanitation

Impact

Exposure to gas emission generated at the landfill site may be highly annoyed due to bad odour resulting from improper covering of the cells. Similarly, the people working in the landfill site may be exposed to high noise levels during unloading and compacting of the solid wastes. Animals and insects existing in the site may result in spreading of infectious diseases and annoyance to the local people due to waste dispersion and contamination of waste. This may pose risk to community health and safety from odor and diseases transmitted by flies, insects, birds and rats.

Local people may also be highly annoyed due to dispersion of wastes during transportation.

Mitigation Measures

Collection, storage and compaction of the solid waste will be properly handled to prevent generation of bad odor. Continuous cover over the cell will be maintained to prevent odor impact. Dispersion of solid waste during transportation, storage and compaction will be checked by proper handling. Visits of animals like dogs, cats, rats in site will be controlled strictly and insects such as flies will be controlled to the extent possible by applying the chemicals.

Mitigation cost is provisioned as sub-project design, operation and maintenance cost.

(ii) Local Disturbance in Transportation of Waste

Impact

Though there is no settlement area near the landfill site within one to two kilometer periphery, but the settlement nearby use the access road common to landfill site leading to their residence. The local people may oppose and hinder in transportation of waste to the landfill site raising issues of bad smell and littering of waste to their locality creating unhygienic condition. This could lead in risk of disturbances by the local people in transportation of wastes to the Sanitary Landfill site. The magnitude of impact has been evaluated as high, extent site –specific and duration long-term.

Mitigation Measures

The project will ensure that all the waste carrying vehicles are properly covered and no littering of waste occurs while transportation. The access road leading to landfill site will be

well maintained. *Mitigation cost is provisioned as sub-project design, operation and maintenance cost.*

(iii) Nuisance due to Inadequate Supply of Water

Impact

The proposed sanitary landfill site constitutes various building (i.e. staff quarters, office, training centre, watchman quarters, toilets for each components, workshop office etc.) which are provisioned with adequate water supply network. But, during the course of operation of the site, there lies risks of nuisance to neighbors by non-functioning of toilets due to lack of inadequate supply of water. Since all the provision for adequate supply of water is made in the detail design, the magnitude of impact is evaluated as low, extent site specific and duration long term.

Mitigation Measures

The project and the Birgunj Municipality will ensure that adequate water supply and sanitary equipments are maintained during entire period of operation of landfill site. *Mitigation cost is provisioned as sub-project design, operation and maintenance cost.*

(iv) Occupational Health and Safety

Impact

The workers may be exposed to high noise levels during unloading and compaction of the solid waste. They may be exposed to high levels of dust during new cell construction, plying of wastes transportation vehicles, unloading and covering the cells. The gas emissions generated may affect health of the workers. Probable existence of hazardous waste entering the site may affect health of the workers if not managed in proper manner.

Mitigation Measures

Workers will be provided with safety equipment and safety procedures will be implemented as far as possible. Drivers and workers will be trained and made aware on proper handling of waste and personal protections. They will also be trained on identifying hazardous waste and proper safety procedures on handling and reporting such items.

Routine medical exams for workers will be carried out. The area being sensitive, entry of unauthorized person will be restricted. As per the demand of the local people, a health care center for workers and neighborhood has been provisioned in the detailed design. *Estimated cost of **NRs. 1,500,000** has been allocated for the purpose with the location to be identified and provided by the Birgunj Municipality.*

(v) Employment for Locals

Upon completion of the construction work, the sub-project will definitely require some permanent posts for the smooth operation and regular maintenance of the sub-project. Local people will be given preference during recruitment of necessary personnel for administrative and technical works according to their qualifications and skills. These are considered as beneficial impact.

(vi) Rodents and Impact on Agro-Productivity

Impact

Animals and insects existing in the site may result in spreading of infectious diseases and nearby agro-productivity could be affected due to waste dispersion and contamination. This may pose risk to surrounding agro-productivity from diseases transmitted by flies, insects, birds and rats. Since the operation of landfill site will be strictly in a sanitary manner, the impact has been evaluated low in magnitude, site-specific in extent and long term in duration.

Mitigation Measures

Collection, storage and compaction of the solid waste with immediate cover will be properly handled to prevent transmission of waste by insects, birds, flies and rats. Dispersion of solid waste during transportation, storage and compaction will be checked by proper handling. Visits of animals like dogs, cats, rats in site will be controlled strictly and insects such as flies will be controlled to the extent possible by applying the chemicals. *Mitigation cost is provisioned as sub-project design, operation and maintenance cost.*

(vii) Aesthetic Values, Foul/Bad Odor

Impact

Bad smell is one of the characteristic of solid wastes. Sometimes the collection of waste in the cities is delayed due to various reasons. On such occasions the waste remains dumped on streets or roads for quite some time. Ultimately when they are transported to the landfill site they would be in the decomposition stage. When such waste are mixed and shuffled, it produces very bad smell which would extend to a larger distance than normal.

In addition to this, the leachate collected and treatment process in stabilization ponds gives bad smell to some extent. However, the smell will not be as bad as the shuffling of old waste. The magnitude of impact will be high, the duration long-term and the extent beyond the site (i.e. local).

Mitigation Measures

The solid waste will be brought into the landfill site as early in the day as possible without undue delay covered properly in the waste carrying vehicle. The shuffling of waste will be carried out when the wind blow is less. All the staff working in the landfill site will be provided with quality mouth mask. Buffer area/strip all around the landfill site and daily cover of disposed waste with clay liner has been proposed to prevent the foul smell spreading in the community. *Mitigation cost is provisioned as sub-project operation and maintenance cost.*

(viii) Site Recovery upon Saturation of Landfill Site Capacity

Upon saturation of the landfill site, it has been planned to develop the site as the recreation ground which could be used by the local communities as well as people from Birgunj and Kalaiya. This benefit is expected to come after quite some time. However, once the site is fully developed for the recreation purpose it could remain in service for a very long period if

properly maintained and operated. The magnitude, extent and duration of this benefit will be medium, local and long term respectively.

The cost of developing the landfill site into a recreation park or play ground will be part of project cost.

6.3 Summary of Mitigation Cost

Most of the mitigation costs are included as in-built in design and estimate. However, mitigation cost not included in in-built design and estimated separately to be included as part of the contractor's bill of quantity is as listed below.

Table 6.4: Summary of Mitigation Matrix

S.No.	Particulars	Estimated Cost in NRs
1	**Environmental Enhancement**	
	Construction of well managed cemetery and contribution to local schools and temples	4,000,000
2	**Environmental Mitigation – Construction Stage**	
	Water quality monitoring – (3 sites x 12 times x 35,000)	1,260,000
	Clearing of trees and compensatory plantation	1,766,270
3	**Environmental Mitigation – Operation Stage**	
	Water/leachate quality monitoring (5 sites x 12 times x 35,000)	2,100,000
	Provision of health care center	1,500,000
	Total	**10,626,270**

7. ALTERNATIVE ANALYSIS

Within the outlined scope of work, the following alternatives for implementation of the proposal were analyzed pertaining to environmental impacts of the project activities. The alternative analysis mainly focuses on project site; project design, technology selection and operation; and no project options. The proposed sub-project will certainly have a significant impact on the beneficiaries as well as the environment.

7.1 Project Site, Design and Layout Planning

7.1.1 Project Site

Initially three alternative sites were identified for Sanitary Landfill. Those were Inaruwa, Masaharwa and Managadawa. Birgunj Municipality decided to develop solid waste resource processing centre at Masaharwa which is located in Bishrampur and Itiyahi VDC of Bara District near south-eastern boundary of Birgunj Municipality of Parsa District. The proposed sanitary land filling process at sanitary landfill in 10.76 ha paddy land is owned by the Birgunj Municipality. Geographically the site is suitable as the nearby settlement is far beyond 500 meters and Singaha river flows along the western border of the proposed site. This provides natural settings in discharge of treated leachate in natural drainage channel. There is no environmentally sensitive area near to the proposed site. The nearest Parsa Wildlife Reserve is around 25 km far from the proposed site. Since there is no settlement nearby, nuisance to neighboring area due to foul order and influx of insects, rodents and public health hazard from odor, and disease transmitted by flies, insects, bird and rats will be insignificant. Surface and ground water pollution from leachate is less likely because the land is used for flooded paddy indicating very low infiltration and the design includes leachate treatment facility with placement of HDPE sheet liner and clay liner system at the bottom as well as along the vertical slope of waste storage dam to prevent leachate contaminating the ground and surface water. The probability of road blockage during construction period is very less as the site is located along rural setting with current low traffic flow. The positive aspect of the proposed site is that it is presently connected with existing gravel road to Ward 19 of Birgunj Municipality which is just around 1.0 km west of the proposed site.

7.1.2 Design and Layout Planning

The key design alternatives relates to the choice of landfilling methods and landfill system including type of leachate treatment plant. While designing the project activities, emphasis was given to urban environment improvement either due consideration on integration among project components and concentration of investment in few localities; inclusiveness and equity in participation with focus to urban poor and disadvantaged groups; public-private partnership; and demand from the proponent i.e. PIU-Birgunj Municipality.

The locations of the facilities and the landfill area for the site was based on the flat topography, anticipated traffic patterns, location of existing roads, location of the river channels, etc. As per site condition, the landfilling methods and operations adopted is area method where filling operation of solid waste is carried out by building an earthen dam all

around the proposed landfill cells as the terrain is unsuitable for the excavation of trenches in which to place the solid waste.

Anaerobic Sanitary Landfill system has been designed against Re-circulatory Semi-aerobic Sanitary Landfill system as the former is simple during operation and is less costly. The anaerobic sanitary landfill structure constitutes leachate collecting pipe installed at the bottom for drainage. The pipe ends are not exposed to air (the main leachate pipe outlet is immersed in the leachate pond). There is no conveyance of air into the waste disposal area and the wastes decomposition is mainly in anaerobic condition. The decision to re-circulate leachate back into the landfill to promote rapid degradation of the waste was not made because of its operational complexity and literature on landfill operations indicate that there is no long term advantage for such a system.

There are various types of storage dam such as RCC retaining structure, concrete gravity dam, soil cement dam and earthen gravity dam. Each of them has its own advantage and disadvantage. RCC and concrete dams occupy less space compared to the soil cement or earthen dam but they are expensive. The earthen dams are cost effective compare to other but it occupies large area reducing the capacity of the land fill. Among these, the design consideration has been made to earthen dam for its cost effectiveness and availability of adequate space for anticipated 15 years life span.

The bottom grades were chosen based on depth to groundwater and landfill stability requirements. The bottom liner has been designed to be made up of composite of imported red clay layer and geomembrane (HDPE sheet liners). The blanket leachate collection and recovery layer was designed to drain into a collection drain located at a central point at the down gradient end of the landfill. These will go either to the Leachate Treatment Plant or a series of anaerobic, facultative and maturation ponds down slope depending on the leachate characteristics. The leachate management system would remain operational throughout the post-closure period. Methane and other gases will be generated as the waste degrades within the landfill mass. Gas collection facilities consists of collection wells and a flaring station depending upon the characteristics of the deposited waste after composting and other waste recovery and processing activities. As with the leachate management system, the flaring station will be operated throughout the post-closure period.

The waste will be placed in multiple, compacted lifts with daily soil cover. When an area reaches its final grade, intermediate cover (300mm thick) shall be placed to minimize infiltration of rainfall and to prevent infestation by insects, rodents, or other disease vectors until the final cover is constructed. Surface water drainage benches has been laid out at vertical intervals on the side slopes up to the final landfill height. Berms has been provided on the top cap to divert water to collection ditches and down drains to transport water off the cap. Access to the cap has been provided from several entry points at various locations around the facility.

The final fill height for the site has been established based on the final area allocated for the sanitary landfill cells and landfill stability requirements. The cover design is based on locally available vegetative/protective cover layer and a drainage layer overlying a low permeability infiltration barrier. At closure, the cover is planned for seeding as necessary to promote re-vegetation to minimize erosion and potential damage to the cap.

Community composting area has been allocated in layout planning that is also designed to be a training ground for composting of organic waste coming from whole sub-metropolitan city of Birgunj. The proposed system consists of a receiving office area, two composting machines with hammermills or shredder, windrow compost piles and transfer sheds for aeration and maturation into compost. An enzymes or microbial activators will be used to hasten the decomposition process. After about 15-30 days (depending on the quality of the compost) of transferring from one storage shed to another, the compost will then be hammermilled again or shredded to inspection, fine screened and bagged for production and sale.

7.2 Technology and Procedure of Operation

Different strategies and approaches have been adopted in designing project activities, selecting the technologies and operational procedures after reviewing best practices, guidelines and standards.

The operational plan enables the site preparation, landfill cell construction, soil cover, leachate treatment, gas management, record keeping activities, closure activities and environmental monitoring (during landfilling and post-closure) to be conducted in a safe, efficient, and environmentally sound manner.

Unloading of solid wastes shall be confined to a small area as possible to accommodate the number of vehicles using the area without resulting in traffic, personnel, or public safety hazards. Waste materials shall normally be deposited at the toe of the fill. For practical purposes, the working area has been set at 1.5m high cell lifts with 6 meter widths and 20 meter length for each working day after which daily cover of clayey material will be applied.

Solid waste will be spread and compacted in layers with repeated passages of the landfill equipment to minimize voids within the cell and maximize compaction. The loose layer shall not exceed a depth approximately 0.60m before compaction. Spreading and compacting will be accomplished as rapidly as practicable. Covered surfaces of the disposal area shall be graded to promote lateral runoff of precipitation and to prevent ponding. Grades will be established of sufficient slopes to account for future settlement of the fill surface. Cover material or native material unsuitable for cover, stockpiled on the site for use or removal, will be placed so as not to cause problems or interfere with unloading, spreading, compacting, access, safety, drainage or other operations.

Priorities have been given to labour intensive technologies and community led basic sanitation for all with gender consideration. The working procedures proposed are participatory one. Awareness creation and skill development activities for the improvement of environment, health and hygiene have also been integrated with the development of basic infrastructures facilities. The project will use local materials as far as possible.

7.3 Time Schedule and Raw Materials to be used

The proposed sub-project under STIUEIP will be implemented over 2 years upon work commencement with the provision of single ICB contract package for civil works and supply and installation of plant and equipment. A one year defects liability period is allocated to carry out defects remedial works. The earth work activities of the Project will be avoided

during monsoon period. The construction activities will be carried out during day hours only. The project will use local materials as far as possible.

Time Schedule Chart

Description	2012	2013	2014	2015	2016
Detail Design and Procurement					
Construction Management/Supervision					
Defects Liability Period					

7.4 Do Nothing Alternative

Incidence of health hazard (mosquito, flies/odor nuisance and infiltration to ground water) due to lack of proper management of solid waste are some of the main environmental problems in Birgunj. Such problems are likely to be intensified in future if the solid waste of Birgunj is not managed properly for disposal to Sanitary Landfill. Implementation of the proposed subproject will improve the environmental condition of the city and health and safety of the community by reducing environmental pollution on the one hand and awareness creation on the other. It will also help to improve economic condition and livelihood of the poor communities by providing employment opportunities in the project activities. Ultimately, it will help to improve the quality of life of the people living in the municipality. The implementation of the proposed subproject will have more positive impacts. However, adverse impacts will be minimized through implementation of proposed mitigation and monitoring measures.

8. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

8.1 Background

The environmental management, monitoring and audit is formulated in accordance with EIA requirements of Nepal. The objective of the Environmental Management Plan (EMP) is to formulate a framework to ensure that all mitigation measures are implemented providing basis for examining whether the mitigation measures are effective after implementation. The EMP ensures that all mitigation measures and monitoring requirements specified in this study report will be carried out in subsequent stages of project development.

The Environmental Management Plan (EMP) delineates key issues likely to arise from Project implementation, and proposes mitigation measures, including monitoring schedule and responsibility. The EMP also outlines environmental management roles and responsibilities, sub-project design and construction management of different activities, site supervision, monitoring and reporting, records, and corrective measures, improvement proposals, and cost estimates for mitigation measures. The EMP is detailed in **Table 8.2**, presented at the end of the section and will form a part of Bidding Document. Environmental Compliance Monitoring Plan and Environmental Impact Monitoring Plan is presented in **Table 8.3** and **Table 8.4** respectively delineating monitoring indicators, period, and frequency during various stages of Project implementation and operation.

8.2 Objectives of the EMP

- Define environmental management principles in particular the implementation of EMP;
- Describe practical mitigation measures that shall be implemented during project construction and ancillary sites to prevent or mitigate environmental impacts;
- Establish roles and responsibilities of all parties involved in the implementation of environmental controls;
- Formulate supervision, monitoring, auditing and reporting framework

8.3 Project Organization

For urban projects, Ministry of Urban Development (MoUD) is legally responsible for project management and monitoring works. The PIU, STIUEIP-Birgunj will carry out the management/monitoring of the implementation of the EMP by the Contractor through its Design and Supervision Consultant.

PIU, STIUEIP-Birgunj will co-ordinate with DUDBC/PCO and get the technical assistance required for the implementation of the environmental protection measures. PIU, STIUEIP-Birgunj may also seek additional technical assistance from the Ministry of Forests and Soil Conservation and the Ministry of Science, Technology and Environment as and when necessary.

PIU staff will work alongside the construction and operation to ensure that the measures and requirements outlined in the EMP are carried out effectively. The Environmental Organization Structure is presented in **Figure 8.1**.

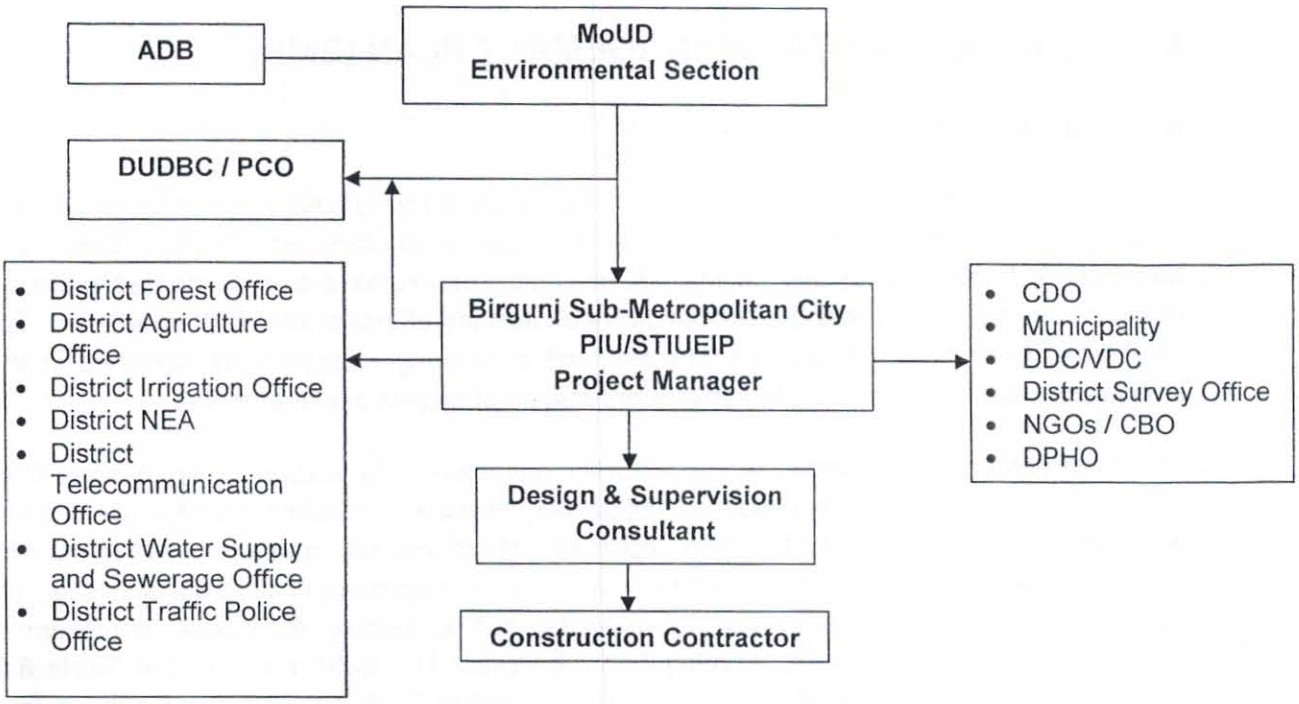


Figure 8.1: Environmental Management Organizational Structure

8.4 Environmental Management Roles and Responsibility

Responsibility for environmental management associated with implementation of Secondary Towns Integrated Urban Environment Improvement Project for Birgunj Municipality involves number of parties, each with specific responsibilities for particular activities.

(a) The six main parties responsible for the design and implementation of mitigation measures prior to, during and following sub-project implementation are:

- Ministry of Urban Development (MoUD)
- DUDBC/ PCO STIUEIP
- PIU, STIUEIP-Birgunj
- Asian Development Bank (ADB)
- Design and Supervision Consultant
- Construction Contractor

The specific roles and responsibility of the parties are as follows.

Ministry of Urban Development (MoUD)

- Review and comment on EIA for final approval from MoSTE.
- Give permission for Project Implementation.
- Within the urban sector MoUD bears the responsibility for environmental safeguarding.
- Review project design & contract documents against approved EIA measures and national environmental standards and give comments for corrective actions.
- Review of monitoring reports of project construction and operation and give comments for corrective actions.

DUDBC/PCO STIUEIP

- The Department of Urban Development and Building Construction (DUDBC), Project Coordination Office (PCO), as co-ordination, monitoring and implementation agency is responsible for overall coordination, monitoring and implementation of STIUEIP.
- Environmental monitoring/management works assisted by Project Management Support Consultant (PMSC).

PIU/STIUEIP- Birgunj

- Project Implementation Unit (PIU), STIUEIP-Birgunj with technical assistance from DUDBC, PCO will undertake environmental assessment functions, as well as monitoring of sub-projects and provision of advice relating to design of environmental mitigation and enhancement measures, and the setting of environmental quality standards.
- PIU Project Manager will be responsible for implementation of the Project.
- Clearance for possession of site and land acquisition, if any.
- Review and approval of detailed project construction designs.
- Obtaining necessary permits from GoN for project construction activities including liaising with various Government Institutions (i.e. District Forest Office, District Agriculture Office, District Irrigation Office, Office of Nepal Electricity Authority, District Telecommunication Office, District Water Supply and Sewerage Office, Traffic Police Office, District Administration Office, District Survey Office etc.) and Local Bodies (i.e. Municipality, DDC, VDC etc.) including NGO/CBO.
- Review and approval of survey, marking and subproject works.
- Review and approval of proposed ancillary work sites (including workforce camps, quarries, borrow pits and storage areas).
- Project maintenance and environmental monitoring and management following handover by the Contractor.
- The operators of Birgunj Municipality will be responsible for operation and maintenance of the newly developed system.

Asian Development Bank (ADB)

- Overseeing of DUDBC project management in accordance with loan conditions.
- Overseeing the detailed design and EMP, including periodic site visits to ensure compliance.

Design and Supervision Consultant (PIU's representative)

- Preparation of final project construction design, conduct required environmental studies and EMP design recommendations.
- Survey and pegging of project construction design works.
- Supervision of the Contractor to ensure work to be undertaken as per sub-project construction contract.
- Inspection and reporting of Contractor's activities to ensure effective implementation of the EMP.
- Auditing Contractor's works and activities against the conditions set out in EMP.
- Issuing corrective action requests and conducting follow up inspections and evaluation of corrective actions.

- Reporting all non-conformances to the Project Manager, PIU, STIUEIP, Birgunj.
- Certifying correctly constructed sub-project works for payment.

Construction Contractor

- Construction of detailed project design works and implementation of EMP.
- Participation in site inspections and audits undertaken by the Design and Supervision Consultant.
- Implementation of corrective actions in response to requests made by the Design and Supervision Consultant regarding specific environmental safeguards.

(b) Similarly roles and responsibilities of other local, district and central level institutions and those affected by the project construction will also be equally important and the project proponent will maintain interaction and coordination with all of them accordingly. The roles and responsibilities are as briefed below.

Ministry of Science, Technology and Environment (MoSTE)

- Final approval of the EIA reports as per the provisions of Act and Rules and issue environmental clearance.
- Review of project monitoring reports during construction and operation phases and give comments for corrective actions.
- Auditing of project general performance after two years of operation phase.

District Forest Office

- Give approval and permission for tree clearance.
- Assist proponent in pegging, measuring and evaluation of the affected tree.
- Review of monitoring reports of project construction and operation and give comments for corrective actions related to vegetation.

Municipality / DDC

- Provide recommendation to the proponent with comments and suggestions and assist proponent in the project implementation.
- Assist in public consultation awareness building organized by the proponent.
- Assist and provide suggestions to the proponent in the matters related to community mobilization.
- Assist MoSTE in the proposal audit.
- Review of monitoring reports of project construction and operation and give comments for corrective actions.
- Ensure that transparency in the project activities are maintained by all the concerned stakeholders as per EIA report and commitments.
- The operators of Birgunj Municipality will be responsible for operation and maintenance of the newly developed system.

8.5 Monitoring and Evaluation

The MoUD will evaluate the monitoring results, as and when necessary for review and comment from MoSTE.

The monitoring for compliance of recommended mitigation measures during construction and post-construction certification inspection of each completed section of sub-project and each rehabilitated ancillary sites shall be undertaken by the Design and Supervision Consultant on Behalf of PIU, STIUEIP-Birgunj. The cost for monitoring during construction and post-construction certification inspection is included in the project implementation cost.

During Construction, PIU-STIUEIP-Birgunj and ADB will carry out external monitoring of the environmental compliance carried out by the Contractor while the Design and Supervision Consultant will carry out internal monitoring at field. During operational phase, ADB will carry out external monitoring while PIU-STIUEIP-Birgunj will carry out internal monitoring.

8.6 Environmental Audit

The Environmental audit of the project will be carried out by Ministry of Science, Technology and Environment (MoSTE) after two years of project operation as per the provision of EPR and the estimated cost of **NRs. 600,000** has been allocated for this purpose.

During the course of carrying out monitoring and evaluation of impact, if the actual impact is found higher than the one specified in the conditions prescribed at the time of approving the proposal, the MoSTE through MoUD shall issue necessary directives to the proponent to adopt measures to reduce or control such impact. Monitoring activities during Project operation will focus on recording environmental performance and proposing remedial actions to address unexpected impacts.

8.7 Site Supervision, Monitoring and Reporting

Strict supervision of sub-project construction activities is required prior to, during and following construction to ensure that works are constructed in accordance with the approved designs and that environmental impact are fully mitigated in accordance with the EMP. A standard system of site inspections, reporting and approval shall be undertaken during the life of sub-project, as described below.

8.7.1 Pre-Construction Phase

Pre-construction inspections of each section of the project component and all ancillary sites shall be undertaken by the Design and Supervision Consultant and Contractor. It will serve to:

- Identify site specific sub-project construction or environmental problems.
- Identify existing services and public utilities that are required to be reinstated, extended, and re-located.
- Identify construction waste disposal sites.
- Identify quarries and borrow pits site for extraction of construction materials.
- Identify labor and work force camp sites.
- Plan of phasing of construction along the drainage, sewerage and road alignment.

Design and Supervision Consultant and Contractor shall discuss and agree upon the factors listed above and document accordingly. The Design and Supervision Consultant shall review the sites pegged by the Contractor and approve them for construction where appropriate, or request the Contractor to re-peg sites. The cost for inspection is included in the sub-project implementation cost.

8.7.2 Construction Phase

The Contractor is wholly responsible for complying with all aspects in the construction contract pertaining to environmental protection provisions and must at all times during the contract term provide clear evidence that contract requirements are being met.

The Design and Supervision Consultant shall undertake appropriate supervisions of sub-project works during construction, and inspections of ancillary sites during their period of use. For non-compliance activities as per EMP contract conditions, notice shall be issued for rectification accordingly and if required, pay items shall be withheld.

The Design and Supervision Consultant shall undertake appropriate inspection of all ancillary sites in use over preceding months, as well as any ancillary site activities currently in progress, at the end of each month in conjunction with the Contractor. If any activities are not being undertaken in accordance with the contract or EMP conditions, the Design and Supervision Consultant shall document these and specify corrective measures in the Monthly Report. The Design and Supervision Consultant shall provide a copy of the Monthly Report to the Contractor of the inspection for action. The cost for supervision is included in the sub-project implementation cost.

8.7.3 Post - Construction Phase

The Design and Supervision Consultant shall undertake a post-construction certification inspection of each completed section of sub-project component and each rehabilitated ancillary sites. Certification shall be based upon the contract conditions and EMP conditions. The cost for post-construction certification inspection is included in the project implementation cost.

8.7.4 Operation and Maintenance Phase

The environmental monitoring of project during the sub-project operation and maintenance phase shall concentrate on the major identified potential impacts of the project.

The PIU, STIUEIP-Birgunj shall undertake regular inspection of the sub-project component and related features upon completion of sub-project construction. The inspection will include an assessment of:

- Proper land filling on landfill cells, placement of cover material, compaction, grading, cleaning and proper operation of plant and equipment
- Waste segregation, separation and composting
- Appropriate operation of leachate treatment plant
- Ground and surface water quality monitoring
- Drains and drainage lines, their stability and drainage line erosion
- Health and safety hazard for workers
- Blockage of drains and cross-drainage
- Nuisance to neighbouring areas due to odor, insects and rodent
- Removal and disposal of sludge from treatment plant
- Road surface condition
- Management of project structures such as toilets, administrative buildings, staff quarters, guard posts, office buildings, plant and equipment maintenance unit, parking lots etc.
- Embanked slope stability and vegetative cover on earthen dam for waste storage.
- Damage from sedimentation.

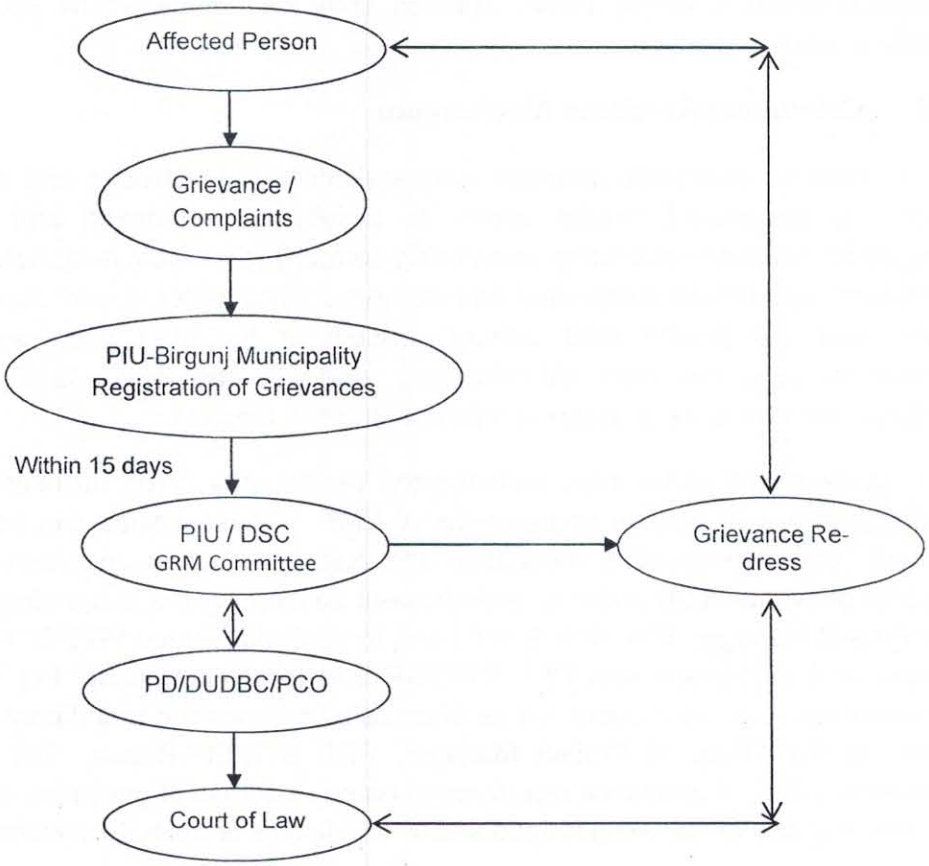
Standard report covering above features shall be completed by PIU, STIUEIP-Birgunj following each inspection.

8.8 Grievance Re-dress Mechanism

Public dissent, especially amongst local stakeholders is obvious and common to surface upon the sub-project stretch where its activity is undertaken and continued without suggested environmental safeguards being correctly respected, most notably during material extraction, sub-project excavation and storage of spoil material, and draining out hazardous spills over the private land without consent of the landowner, and finally, creating inconvenience to the locals (littering along road side and arable land, dust hazard, noise pollution etc.) because of inappropriate construction practice.

The concern/grievances from local/affected people may come up related to inappropriate implementation of various components of EMP. These issues can be easily addressed through acknowledgement, evaluation and corrective action and response approach. To resolve grievance from public or stakeholders concerning the sub-project will be directed to the Project Manager, PIU, STIUEIP-Birgunj through nominated PRO who will address social issues and coordinate with PIU, STIUEIP and local community. For local stakeholders' convenience, this mechanism will be affected by establishing mandatory "grievance register book" at the Office of Project Manager, PIU, STIUEIP-Birgunj. The register book will delineate i) date of grievance registered ii) name / address of grievance lodger (stakeholder) iii) nature of grievance being lodged and iv) location / site of fault works requiring corrections.

Firstly, it will be assessed if the grievances are genuine or suggestion is acceptable. Accordingly, response will be given within 15-30 days by the PIU, STIUEIP-Birgunj in consultation with the Design and Supervision Consultant. In case the Project Manager, PIU, STIUEIP-Birgunj through Design and Supervision Consultant is unable to resolve the issue, the matter will be forwarded to the PD, DUDBC/PCO. The corrective action will be carried out as per the response or action plan indicated to the stakeholder. Lastly if PD, DUDBC/PCO is unable resolve the matter, the matter will be resolved by the court of law. The outcome shall also form part of quarterly progress report. Grievance re-dress mechanism shall be translated in Nepali language and posted to the respective DDC/Municipality office by PIU, STIUEIP-Birgunj at least 30 days prior to commencement of construction works.



Grievance Re-dress Mechanism

8.9 Accident Response Mechanism during Construction

In order to adopt prompt accident response mechanism, at work place, a readily available first aid unit including an adequate supply of dressing materials, technician and a standby vehicle will be provisioned for Accident Response Mechanism. Pertaining to seriousness of the nature of injury, immediate transportation to nearby hospital will also be maintained in the work site.

8.10 Summary of Environmental Mitigation Cost and Benefit Assessment

Most of the mitigation costs are included as in-built in design and estimate. However, mitigation cost not included in in-built design and estimated separately to be included as part of the contractor's bill of quantity is as listed below. The benefit assessment in terms of money could not be assessed at this juncture. However, summary of sub-project benefit is listed in the table below.

Table 8.1: Summary of Mitigation Matrix and Benefit Assessment

S.No.	Particulars	Estimated Cost in NRs
1	**Environmental Enhancement**	
	Construction of well managed cemetery and contribution to local schools and temples	4,000,000
2	**Environmental Mitigation – Construction Stage**	
	Water quality monitoring – (3 sites x 12 times x 35,000)	1,260,000
	Clearing of trees and compensatory plantation	1,766,270
3	**Environmental Mitigation – Operation Stage**	
	Water/leachate quality monitoring (5 sites x 12 times x 35,000)	2,100,000
	Provision of health care center	1,500,000
4	**Cost for Environmental Audit**	600,000
	Total Environmental Mitigation/Monitoring Cost	**11,226,270**
5	**Benefit Assessment**	
	• Employment opportunity to local people. • Transfer of technical skills and know-how. • Increase in economic activity due to project implementation. • Local Development Activity i.e. provision of well managed cemetery, support to local schools, provision of new bridge over Singaha river, and provision of health care centre as per the demand of local people. • Improved Solid Waste Management system of Birgunj Municipality which will reduce environmental risk associated with health hazard and improve environment, health and hygiene of the people as compared to the present haphazard dumping of solid waste in low land area and ponds.	
6	**Total Project Cost including VAT, Price & Physical Contingencies**	**479,992,077.27**
7	**Percentage of Environmental Cost to the Project Cost**	**2.34%**

8.11 Environmental Management and Monitoring Plan

Table 8.2, 8.3 and 8.4 presents Environmental Management Plan, Compliance Monitoring Plan and Impact Monitoring Plan respectively.

Table 8.2: Environmental Management Plan (EMP)

Environmental Issues / Component	Mitigation Measures / Actions	Approximate Location	Time Frame	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implement ation	Supervision
[A] Environmental Enhancements						
1. Employment Opportunity	• Project emphasizes in obtaining labor from the project influence area to the extent possible pertaining to their skill and capacity.	Throughout project area	Construction and Operation	Construction Contract	Contractor	DSC, PIU / Municipality
2. Technical Skill and Khow-how	• Enhancement of technical skill by providing training for local laborers in construction techniques.	Throughout project area	Construction	Project Cost	Project nominated NGO	DSC, PIU / Municipality
3. Local Economy	• The sub-project will encourage its staff and construction workers to purchase local products in order to uplift the economic condition of local farmers.	Throughout project area	Construction	Project Cost	Project nominated NGO	DSC, PIU / Municipality
4. Local Development Activity	• As per the demand of the local people, the sub-project provisions construction of well managed cemetery nearby proposed landfill site and contribution to the local schools and temples for its development. • The contribution to school will cover supply of black boards, chalks, Duster, sports materials, improvement of playground etc. and contribution to temples will include repair and maintenance.	Project area	Construction	4,000,000	Contractor	DSC, PIU / Municipality
5. Developed Infrastructure for Solid Waste Disposal	• The developed infrastructure will facilitate in sanitary disposal of solid wastes which will reduce environmental risk associated with health hazard and improve environment, health and hygiene of the people. • Provisions composting center where bio-degradable waste will be separated, shredded, place them into windrow compost piles, transfer to compost maturation bins, post-harvest screening/packaging, and final storage and sale of compost product to farmers. • As per local demand, the Municipality has been recommended to make an arrangement for sale of compost product in a cheaper rate to the local farmers.	Project area	Operation	Project Cost	Municipal Operators	PIU / Municipality
6. Reclamation of Landfill Site	• Upon saturation, the site will be developed as recreation ground.	Project area	Operation	Project Cost	Municipal nominated	PIU / Municipality

Table 8.2: Environmental Management Plan (EMP)

Environmental Issues / Component	Mitigation Measures / Actions	Approximate Location	Time Frame	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implement ation	Supervision
					Contractor	
7. Local Development Activity	• It is proposed that the community will get the development fund through the incoming waste in the landfill site rather than depending on the discretion of Government authority.	Around project area	Operation	Development fund through Incoming waste	PIU / Municipality	BSMC
[B] Pre-Construction Stage						
1. Land and Building Acquisition	• No land and building will require acquisition as the proposed site area is owned by BSMC.	Project area	Design/Pre - Construction	Project Cost	PIU / Municipality, DSC	PIU / Municipality
2. Permits	• Obtain necessary permits for commencement of project work and provide a copy to the Contractor. • Obtain written permission from landholders, Municipality, DDC, VDC under the Local Self-Governance Act, 1998 prior to commencement of various activities related to construction work and provide copies to the Supervising Consultant.	Project area	Pre – Construction	Project Preparation Cost Construction Contract	PIU / Municipality, DSC Contractor	PIU / Municipality DSC, PIU / Municipality
3. Worksite survey, Pegging and approval	• Conduct layout survey of the proposed project works. • Locate, peg out and seek approval from the Supervising Consultant for each ancillary site prior to the commencement of related activities. • Inspect and approve, if correct all ancillary sites.	Project area	Pre - Construction	Construction Contract	Contractor	DSC, PIU / Municipality
[C] Construction						
C1. Physical and Chemical Environment						
1. Landscape Disturbance	• Minimize disturbance to the surrounding area. • All natural drainage channels to be guided to give continuity towards its natural flow.	Project Area	Design & Construction	Construction Contract	Contractor	DSC, PIU / Municipality
2. Land Stability and Soil	• Proper and adequate shoring work to avoid slide. • Minimize exposure of excavation work.	Project area.	Design & Construction	Construction Contract	Contractor	DSC, PIU / Municipality

Table 8.2: Environmental Management Plan (EMP)

Environmental Issues / Component	Mitigation Measures / Actions	Approximate Location	Time Frame	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implement ation	Supervision
Erosion	• River bank protection works with gabion walls and gabion mattress. • Broadcasting of grass seeds at the rate of 25 gm/m^2 for embanked slopes (around 40,000 m^2). • Development and approval of a sediment and erosion control plan prior to land disturbance. • Removal of spoils as soon as it is excavated. • Disposal of spoils in municipal – approved sites. • Well planned drainage channels and blacktopped roads all around including concrete pavement over parking and vehicle wash/maintenance area.					
3. Noise Level	• Consult with the local community to inform them of the nature, duration and likely effects of the construction work, and to identify any local concerns so that these can be addressed. • Avoid noise generating activities at night. • Minimization of the period of construction. • Noise barriers to be placed at appropriate location. • Noise producing engines will be fitted with noise reducing equipment. • All vehicles plying in the construction area will be maintained regularly as per the manufacturer's recommendations.	Project area	Construction	Construction Contract	Contractor	DSC, PIU / Municipality
4. Air Quality	• Reduce dust by spraying water on stockpiled soil, excavated materials, and spoils. • Construction area and access road to the site shall be maintained damp by periodical spray of water. • Cover stockpiled construction materials with tarpaulin. • Ensure delivery vehicles be covered. • Enforce construction contractor to produce and	Project area.	Construction	Construction Contract	Contractor	DSC, PIU / Municipality

Table 8.2: Environmental Management Plan (EMP)

Environmental Issues / Component	Mitigation Measures / Actions	Approximate Location	Time Frame	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implement ation	Supervision
	implement a site Health and Safety (H&S) Plan that includes: (a) excluding the public from the site, (b) ensure that all workers are provided with and use appropriate personal protective equipment, (c) H&S training for all site personnel, (d) documented procedures to be followed for all site activities, and (e) documentation of work-related accidents. • The Contractor will implement safety measures against accident risks. • All construction vehicles will comply with Motor Vehicles and Transportation Management Act as amended. • Ensure use of vehicles complying with NVMES 2069 BS.					
5. Water Quality	• Surface and ground water reserves will be protected from any source of contamination such as construction and oily waste that will degrade its potable quality. • Solid wastes shall be disposed off in designated sites and covered so that scattering of waste by rodents and birds will be avoided. • Ensure that the construction debris do not find their way into the drainage or irrigation canals which may get clogged. • Prohibit washing of machinery and vehicles in surface waters, provide sealed washing basins and collect wastewater in sedimentation/retention pond. • Contractor needs to arrange for sufficient water supplies and proper sanitation facilities for its labor force. • Regular water quality monitoring (physico-chemical and microbiological tests) according to determined sampling schedule conforming to test parameters carried out during baseline survey kept in Annex 8.	Project area. Three sensitive sites (1 for ground water and 2 for surface water) as directed by DSC	Construction Every 2 months	Construction Contract Estimated cost for Water Quality Monitoring: **NRs. 1,260,000.00** [3 sites x 12 times x 35,000] (This activity is also indicated in compliance and Impact Monitoring Plan)	Contractor Through approved monitoring agency.	DSC, PIU / Municipality DSC, PIU / Municipality

Table 8.2: Environmental Management Plan (EMP)

Environmental Issues / Component	Mitigation Measures / Actions	Approximate Location	Time Frame	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implement ation	Supervision
6. Operation and Closure of Quarries and Borrow pits	• Locate and peg quarries and seek approval from the supervising consultant. • Obtain permission/license for extraction of materials from stakeholders, Municipality, DDC or VDC as appropriate. • Locate extraction sites restricted to small areas, preferably on existing quarry sites and sites without any tree cover, away from dwellings, archeological, religious or cultural sites, sites which will not alter river flow regime and possess water logging problem in future, and sites where effects will be temporary. • Prevent ponding of water through adequate drainage. • The depth of the pits should be regulated so that the sides of the excavation will have a slope not steeper than 1:4. • Stripped materials shall be stored so as not to disrupt natural drainage and shall be protected so as not to be eroded into surface waters. • Restore the site maintaining natural contours and vegetation.	Location of selected quarries and borrow pits proposed during construction	Construction	Construction Contract	Contractor	DSC, PIU / Municipality
7. Drainage alteration and associated erosion and sediment	• Well planned drainage channels within the sub-project area draining it to Singaha river. • Minimize disturbance to the surrounding area. • All natural drainage channels to be guided to give continuity towards its natural flow. • As demanded by the locals, the project provisions new bridge over Singaha river in place of existing one. • Proposed canal road designed with adequate drainage channel.	Project area	Design and Construction	Construction Contract	Contractor	DSC, PIU / Municipality
8. Leakage of Oil, Grease and other Material	• Construct double berms of concrete around the oil and grease holding structures. • Fuel wood shall not be used for heating bitumen. Bitumen shall be melted in heaters using kerosene,	Project area	Construction	Construction Contract	Contractor	DSC, PIU / Municipality

Table 8.2: Environmental Management Plan (EMP)

Environmental Issues / Component	Mitigation Measures / Actions	Approximate Location	Time Frame	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implement ation	Supervision
	diesel or gas fuel. • Petroleum products will be stored in dedicated areas, not scattered along the road and any small accidental spills will be cleared up immediately. • No petroleum products will be discharged into side drains.					
9. Labor Camp and Solid Waste Disposal Generated by Construction Workers	• Locate, peg and seek approval from Supervising Consultant for labor camp sites. • Camps shall not be located near settlements; near water supply intakes; or sites that affects locals access to drinking water. • Camp shall not be in the vicinity of landslide and flood plains. • Provide and maintain proper drinking water, sewerage and waste disposal facilities at the camps. • The solid waste generated will be separated. Non-degradable waste as plastic, steel, glasses etc. will be recycled while bio-degradable waste will be collected and dumped at proper location approved by Design and Supervision Consultant/Municipality with consent of relevant stakeholders. Open burning of solid waste will be strictly banned during construction. Management of solid waste will be undertaken as per SWMA 2068 BS. • The solid waste will be disposed off at designated location and will be covered by clay material in order to avoid scattering of waste by rodents and birds. • Ensure no wood is burnt by any worker on or off site. Camps shall be provided free of cost, with electricity and regulator & adequate fuel supplies of LPG or Kerosene. • Prohibit workforce from poaching wildlife and cutting trees.	Sites of labor camp	Construction	Construction Contract	Contractor	DSC, PIU / Municipality

Table 8.2: Environmental Management Plan (EMP)

Environmental Issues / Component	Mitigation Measures / Actions	Approximate Location	Time Frame	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implement ation	Supervision
	• After use, sites shall be cleared and restored to near natural or stable conditions with vegetative cover. • Restrict working hours from 7:00 to 18:00. • The Contractor shall not employ child or under aged person as per Labour Act, BS 2048.					
10. Stockpiling of Construction Materials and Spoil Disposal	• Locate, peg and seek approval from the supervising consultant for the use of stockpile sites. • Stockpile should not be located on water courses; should not be within 50m of schools, hospitals or public standpipes; and should not affect locals and their properties. • Obtain written permission from landowners and local bodies for stockpiling on their land. • Stockpiles should be covered with tarpaulins. For large stockpiles, it should be enclosed with side barriers and also covered when not in use. • Provide intervening vegetated buffer to control any un-expected run-off. • Clean area properly after completion. • Locate disposal sites on stable ground without excessive slope; that avoids water courses and wetlands; that will not promote instability and result in destruction of property, vegetation and local services. Preferably permissible sites are abandoned quarry or borrow pit in order to restore original contour. • Restrict disposal at approved locations with correct placement of fill.	Project area	Construction	Construction Contract.	Contractor	DSC, PIU / Municipality
11. Loss of Top Soil	• Mark out extent of clearing within approved worksite areas. • Restrict clearing to the marked areas and not to harvest any forest products for personal consumption or sale. • Stockpile cleared shrub foliage where possible at	Project site	Construction	Construction Contract	Contractor	DSC, PIU / Municipality

Table 8.2: Environmental Management Plan (EMP)

Environmental Issues / Component	Mitigation Measures / Actions	Approximate Location	Time Frame	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implement ation	Supervision
	designated location for later use as brush layer. • Protect remaining vegetation within the proposed site. • Renewal of natural resources (i.e. seed sowing).					
C2. Biological Environment						
1. Clearing of Vegetation	• Coordinate with the concerned authority (Municipality, VDC, DDC, District Forest Office) for proper tagging, felling, stacking and transporting logs at designated location. • Fuel wood use shall be banned for construction works as well as for workers. • Kerosene supply will be regular and easily available to the construction workers. • Identify and seek approval from supervising consultant for felling of trees within the RoW including stacking and handover to concerned authority. Tree: >girth 0.30 – 0.60m = 633 nos. >girth 0.60m – 0.90m = 92 nos. >girth 0.90 – 1.80m = 1 no. >girth 3.0m = 8 no. • Plantation (including protection and management for 5years) of suitable trees around landfill site for creation of buffer area/strip. (around 7330 nos.)	Project area	Construction	Estimated cost for felling of tree: **NRs. 300,270.00** [633x290 = 183,570] [92x1020 = 94,300] [8x2800 = 22,400] Estimated cost for plantation of suitable trees: **NRs. 1,466,000.00** [7330x200] **Total: 1,766,270.00**	Contractor	DSC, PIU / Municipality
C3 Socio-economic and Cultural Environment						
1. Loss of Farmland and other Category of Lands as a	• No acquisition compensation and rehabilitation is required.	Project area.	Pre-construction and Construction	Included in project cost.	PIU / Municipality, DSC, Contractor	DSC, PIU / Municipality

Table 8.2: Environmental Management Plan (EMP)

Environmental Issues / Component	Mitigation Measures / Actions	Approximate Location	Time Frame	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implement ation	Supervision
Part of Site Clearance						
2. Disturbance to Public/Private Utilities and Access to them	• Immediate attendance by the service providers to any damages to utilities during construction. • Ensure site is free from obstructions and storing / disposing of any contractor's equipment or surplus material, and clearing away and removing from the site any wreckage rubbish and temporary works which are no longer required. • As per local demand, the design include internal road within the landfill site which will be used for transfer of waste during operation and upon completion of land filling, it will turn out to form as a periphery road for recreational park to be developed in later stage.	Project area.	Construction	Construction Contract	Contractor	DSC, PIU / Municipality
3. Health and Sanitation	• Awareness on health problems caused by unhealthy sanitation. Proper methods of managing disposal of sewerage and checking of water contamination will be taught to the contractors and workers. • Establish campsite for outside workers. • Camp site will have facilities such as drinking water supply, pit latrines and health clinics along with necessary medicines to the workers and their dependants. • One pit latrine for every 10 workers will be constructed.	Project area and campsite location	Construction	Construction Contract	Contractor	DSC, PIU / Municipality
4. Occupational Health and Safety	• All construction workers and staffs will be covered with accident insurance. • Ensure adequate safety measures to workers such as provision of helmets, masks, gloves, air plugs, road signs, warning signals etc. • To minimize dust to local people, provision of water spray will be made during the dry season. • Construction site will have a provision of health clinics	Project area and locations selected for labor/work camps.	Construction	Construction Contract	Contractor	DSC, PIU / Municipality

Table 8.2: Environmental Management Plan (EMP)

Environmental Issues / Component	Mitigation Measures / Actions	Approximate Location	Time Frame	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implement ation	Supervision
	(as demanded by locals) along with necessary medicines for immediate treatment in case of any accidents. • Provide and maintain adequate space, proper drinking water, sewerage and waste disposal facilities at the camps. • Strict rules and regulation be maintained in the labor and work camp to avoid alcoholic and other bad habits. • Impart construction safety education to all villagers, Schools, clubs and drivers of construction vehicles.					
5. Conflict between Local and Outsiders / Increase in Bad Habit due to Cash Flow	• A local committee representing local political parties will be formed which will be encouraged to impose restrictions on certain activities in the social places so that the workers do not become a nuisance to local people. • Regular surveillance by security people will also be managed. • To develop good relationship and understandings between local community and the project people and to maintain a harmonious relationship between them a public relation officer will be employed.	Project area	Construction	Construction Contract	Contractor	DSC, PIU / Municipality
6. Employment for Locals	• Locals will be given employment to the extent possible depending upon their qualification and availability.	Project area	Construction	Construction Contract	Contractor	DSC, PIU / Municipality
7. Cultural and Aesthetic Sites	• The execution of project activities will not disturb archaeological and/or religious sites of the area.	Project area	Construction	Construction Contract	Contractor	DSC, PIU / Municipality
[D] Operation and Maintenance Stage						
D1. Physical and Chemical Environment						
1. Land Stability and Soil Erosion	• The project will not be disturbing the river banks of the sub-project area. • Provision of plantation creating buffer area/strip all around the landfill site will improve the land stability of	Project area	Operation	Operation and maintenance cost	Contractor during DLP and BSMC after DLP	DSC, PIU / Municipality during DLP and BSMC

Table 8.2: Environmental Management Plan (EMP)

Environmental Issues / Component	Mitigation Measures / Actions	Approximate Location	Time Frame	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implement ation	Supervision
	the project area vicinity.					after DLP
2. Surface Water Hydrology	• River training work along the bank of Singaha river. • Provision of new bridge over Singaha river. • Appropriate drainage channels along the proposed canal road to guide the surface runoffs.	Project area	Operation	Operation and maintenance cost	Contractor during DLP and BSMC after DLP	DSC, PIU / Municipality during DLP and BSMC after DLP
3. Air Quality	• Waste carrying vehicles to be covered properly to avoid littering of the waste. • All the roads and working area within the landfill will be bituminous/concrete paved so that dust emission is minimized. • Vehicles moving out will be properly washed. • The workers within the landfill site will be provided with masks.	Project area	Operation	Operation and maintenance cost	Contractor during DLP and BSMC after DLP	DSC, PIU / Municipality during DLP and BSMC after DLP
4. Leachate Generation and Risk on Water Quality (surface and ground water)	• Provision of horizontal and vertical lining. • Arrangement ensured such that leachate does not get access to the surface and ground water. They are safely collected via perforated pipes and treated prior to disposal. • All the generated leachate will be treated through stabilization ponds (i.e. anaerobic, facultative and maturation ponds). • Effective implementation of these provisions will be made. • Water Quality (ground and surface) needs to be regularly monitored (physico-chemical and microbiological test) conforming to test parameters carried out during baseline survey kept in Annex 8.	Project area Water/leachate Quality Monitoring 1 for treated leachate effluent, 2 sensitive locations for ground water and 2	Operation Every month during DLP and regular after DLP.	Operation and maintenance cost Estimated cost for water quality monitoring during DLP: **NRs. 2,100,000.00** [5 sites x 12 times x 35,000] [These activities	Contractor during DLP and BSMC after DLP Through approved monitoring agency	DSC, PIU / Municipality during DLP and BSMC after DLP

Table 8.2: Environmental Management Plan (EMP)

Environmental Issues / Component	Mitigation Measures / Actions	Approximate Location	Time Frame	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implement ation	Supervision
		sensitive location for surface water		are also indicated in Compliance & Impact Monitoring Plan]		
5. Noise and Vibration	• All the vehicles and equipment will be kept in good condition. • Regular servicing of the vehicles and equipments will be carried out. • The workers will be provided with safety gadgets such as ear plugs, gloves, mouth mask, helmets and boots.	Project area	Operation	Operation and maintenance cost	Contractor during DLP and BSMC after DLP	DSC, PIU / Municipality during DLP and BSMC after DLP
6. Bad Smell	• The solid waste will be brought into the landfill site as early in the day as possible without undue delay covered properly in the waste carrying vehicle. • The shuffling of waste will be carried out when the wind blow is less. • All the staff working in the landfill site will be provided with quality mouth mask. • Buffer area/strip all around the landfill site and daily cover of disposed waste with clay liner has been proposed to prevent the foul smell spreading in the community.	Project area	Operation	Operation and maintenance cost	Contractor during DLP and BSMC after DLP	DSC, PIU / Municipality during DLP and BSMC after DLP
7. Gas Generation, Emission and Dispersion	• Provision of adequate number of fire extinguishers in case of the emergency. • All the workers working within the landfill site will have mouth masks. • Smoking will be strictly prohibited in the landfill site. • Provisions of trapping and flaring up of gases.	Project area	Operation	Operation and maintenance cost	Contractor during DLP and BSMC after DLP	DSC, PIU / Municipality during DLP and BSMC after DLP
8. Availability of Cover Material	• Extraction of the cover material will be planned properly. • Retaining structures will be constructed where required for stable side slopes.	Location of cover material	Operation	Operation and maintenance cost	Contractor during DLP and BSMC	DSC, PIU / Municipality during DLP

Table 8.2: Environmental Management Plan (EMP)

Environmental Issues / Component	Mitigation Measures / Actions	Approximate Location	Time Frame	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implement ation	Supervision
	• Preferably less than 45° slope will be maintained at the borrow sites. • Proper drainage will be provisioned to drain out water.				after DLP	and BSMC after DLP
9. Human Health Associated with Environmental Pollution	• Awareness on health problems that may cause due to unsafe handling of the waste. • Project will ensure adequate safety measures such as provision of helmets, masks, ear plugs etc. are available in the landfill site. • A medical kit with necessary emergency medicines will be made available in the landfill sites. • Regular and periodic medical check up will be carried out to the staffs working in the site. • All the staffs will be covered by the accident insurance.	Project area	Operation	Operation and maintenance cost	Contractor during DLP and BSMC after DLP	DSC, PIU / Municipality during DLP and BSMC after DLP
10. Impact of Environment on the Project	• The project will ensure that all the waste carrying vehicles are properly covered and no littering of waste occurs while transportation to avoid disturbance from local people.	Project area	Operation	Operation and maintenance cost	Contractor during DLP and BSMC after DLP	DSC, PIU / Municipality during DLP and BSMC after DLP
11. River Pollution and Scattering of Waste by Rodents and Birds	• Ensure that the waste disposal, spreading and compaction operation will be carried out as soon as the wastes are unloaded. • The waste will be covered daily by clay material. • Special attention will be given for the waste brought in from the slaughter houses.	Project area	Operation	Operation and maintenance cost	Contractor during DLP and BSMC after DLP	DSC, PIU / Municipality during DLP and BSMC after DLP
12. Fire Hazard and Access Road Pollution	• Provision of adequate number of fire extinguishers in case of the emergency and all the workers working within the landfill site will have mouth masks. • Smoking will be strictly prohibited in the landfill site. • Provisions in trapping and flaring up of gases. • Ensure that all the waste carrying vehicles will be covered properly.	Project area	Operation	Operation and maintenance cost	Contractor during DLP and BSMC after DLP	DSC, PIU / Municipality during DLP and BSMC after DLP

Table 8.2: Environmental Management Plan (EMP)

Environmental Issues / Component	Mitigation Measures / Actions	Approximate Location	Time Frame	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implement ation	Supervision
D2. Biological Environment						
1. Birds Hazards	• Ensure that the waste disposal, spreading and compaction operation will be carried out as soon as the wastes are unloaded. • The waste will be covered daily by clay material. • Special attention will be given for the waste brought in from the slaughter houses.	Project area	Operation	Operation and maintenance cost	Contractor during DLP and BSMC after DLP	DSC, PIU / Municipality during DLP and BSMC after DLP
2. Aquatic Life – Water Pollution	• Horizontal and vertical lining have been proposed in the design. • Arrangement has been made such that leachate does not get access to the surface and ground water. • Leachate is safely collected via perforated pipes and treated prior to disposal. • All the generated leachate will be treated through stabilization ponds (i.e. anaerobic, facultative and maturation ponds). • Effective implementation of these provisions will be made.	Project area	Operation	Operation and maintenance cost	Contractor during DLP and BSMC after DLP	DSC, PIU / Municipality during DLP and BSMC after DLP
D3. Socio-economic and Cultural Environment						
1. Public Health, Health and Sanitation	• Collection, storage and compaction of the solid waste will be properly handled to prevent generation of bad odor. • Continuous cover over the cell will be maintained to prevent odor impact. • Dispersion of solid waste during transportation, storage and compaction will be checked by proper handling. • Visits of animals like dogs, cats, rats in site will be controlled strictly and insects such as flies will be controlled to the extent possible by applying the chemicals.	Project area	Operation	Operation and maintenance cost	Contractor during DLP and BSMC after DLP	DSC, PIU / Municipality during DLP and BSMC after DLP
2. Local Disturbance in	• The project will ensure that all the waste carrying vehicles are properly covered and no littering of waste occurs while transportation.	Project area	Operation	Operation and maintenance	Contractor during DLP	DSC, PIU / Municipality

Table 8.2: Environmental Management Plan (EMP)

Environmental Issues / Component	Mitigation Measures / Actions	Approximate Location	Time Frame	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implement ation	Supervision
Transportation of Waste	• The access road leading to landfill site will be well maintained.			cost	and BSMC after DLP	during DLP and BSMC after DLP
3. Nuisance due to Inadequate Supply of Water	• The project and the Birgunj Municipality will ensure that adequate water supply and sanitary equipments are maintained during entire period of operation of landfill site.	Project area	Operation	Operation and maintenance cost	Contractor during DLP and BSMC after DLP	DSC, PIU / Municipality during DLP and BSMC after DLP
4. Occupational Health and Safety	• Workers will be provided with safety equipment. • Safety procedures will be implemented. • Drivers and workers will be trained and made aware on proper handling of waste and personal protections. • Routine medical exams for workers will be carried out. • Entry of unauthorized person will be restricted. • As per local demand, a health care center for workers and neighborhood has been provisioned.	Project area	Operation	1,500,000	Contractor during DLP and BSMC after DLP	DSC, PIU / Municipality during DLP and BSMC after DLP
5. Employment for Locals	• Local people will be given preference during recruitment of necessary personnel for administrative and technical works according to their qualifications and skills.	Project area	Operation	Operation and maintenance cost	Contractor during DLP and BSMC after DLP	DSC, PIU / Municipality during DLP and BSMC after DLP
6. Rodents and Impact on Agro-Productivity	• Collection, storage and compaction of the solid waste with immediate cover will be properly handled to prevent transmission of waste by insects, birds, flies and rats. • Dispersion of solid waste during transportation, storage and compaction will be checked by proper handling. • Visits of animals like dogs, cats, rats in site will be controlled strictly and insects such as flies will be controlled to the extent possible by applying the chemicals.	Project area	Operation	Operation and maintenance cost	Contractor during DLP and BSMC after DLP	DSC, PIU / Municipality during DLP and BSMC after DLP

Table 8.2: Environmental Management Plan (EMP)

Environmental Issues / Component	Mitigation Measures / Actions	Approximate Location	Time Frame	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implement ation	Supervision
7. Aesthetic Values, Foul/Bad Odor	• The solid waste will be brought into the landfill site as early in the day as possible without undue delay covered properly in the waste carrying vehicle. • The shuffling of waste will be carried out when the wind blow is less. • All the staff working in the landfill site will be provided with quality mouth mask. • Buffer area/strip all around the landfill site and daily cover of disposed waste with clay liner will prevent foul smell spreading in the community.	Project area	Operation	Operation and maintenance cost	Contractor during DLP and BSMC after DLP	DSC, PIU / Municipality during DLP and BSMC after DLP
8. Reclamation of Landfill Site	• Upon saturation, the site will be developed as recreation ground which could be used by the local communities as well as people from Birgunj and Kalaiya.	Project area	After completion of landfill operation	Operation and maintenance cost	BSMC	DUDBC

Note: BSMC = Birgunj Sub-Metropolitan City. DDC = District Development Committee. DLP = Defects Liability Period. DSC = Design and Supervising Consultant. DUDBC = Department of Urban Development and Building Construction. PIU/Municipality = Project Implementation Unit / Birgunj Municipality. RoW = Right of Way. VDC = Village Development Committee.

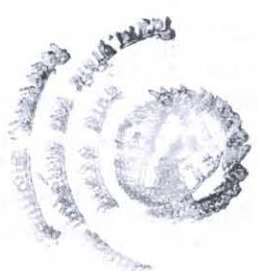


Table 8.3: Compliance Monitoring Plan

Predicted Impact	Mitigation Measures	Indicator for Monitoring	Method	Period and Frequency	Approx. Location	Institutional Responsibility	
						Implementation	Supervision
1. Physical and Chemical Environment							
Land Stability and Soil Erosion	• Proper shoring work. • Minimize exposure of excavation work. • River bank protection • Grass seeding for embanked slopes and tree plantation in buffer area/strip • Removal of spoils as soon as possible and disposal of spoils in municipal approved site.	No trench slips No river bank erosion Survival rate of vegetative cover. Scouring and siltation	Direct observation	Regular during construction and operation	Project area	Contractor during construction and DLP. BSMC after DLP.	DSC, PIU / Municipality during construction and DLP. BSMC after DLP.
Noise Pollution	• Notification of construction work to local community. • Avoid project activity at night. • Minimize period of construction. • Ensure plant & equipment conforms to best practices. • Workers provided with appropriate ear muffs / plugs. • Provision of noise barriers	No complaints from local residence.	Direct observation	Regular during construction and operation.	Project area	Contractor during construction and DLP. BSMC after DLP.	DSC, PIU / Municipality during construction and DLP. BSMC after DLP.
Air Pollution	• Construction site	No excess dust	Direct	Regular during	Project area.	Contractor	DSC, PIU /

Table 8.3: Compliance Monitoring Plan

Predicted Impact	Mitigation Measures	Indicator for Monitoring	Method	Period and Frequency	Approx. Location	Institutional Responsibility	
						Implementation	Supervision
	maintained damp by periodical spray of water. • All plying vehicles to comply GoN pollution regulation. • Ensue delivery vehicles be covered. • Cover stockpiled construction materials with tarpaulin. • Implement health and safety plan	deposition on crops and vegetation. No complaints from local residence. Monitoring of evidence issued by concerned agency.	observation	construction and operation.		during construction and DLP. BSMC after DLP.	Municipality during construction and DLP. BSMC after DLP.
Leachate Generation and Water Pollution	• Restrict debris disposal near water bodies. • Provision of toilets, good drainage, proper water supply and solid waste management within work and labour camp. • Prohibit washing machinery and vehicles in surface water. • Horizontal and vertical liners for to avoid ground water contamination.	No siltation. Monitoring of provisions. Physico-chemical and Microbiological tests to WHO standards conforming to test parameters carried out during baseline survey kept in Annex 8.	Direct observation Measurement and analysis	Regularly during construction and operation phase. Water Quality Monitoring, every two months during construction and every month during DLP. Regular monitoring after	Project area Three sensitive locations (1 ground water & 2 surface water) during construction and five sensitive	Contractor during construction and DLP. BSMC after DLP. Through approved monitoring agency	DSC, PIU / Municipality during construction and DLP. BSMC after DLP. DSC, PIU / Municipality during construction and DLP. BSMC after DLP.

Table 8.3: Compliance Monitoring Plan

Predicted Impact	Mitigation Measures	Indicator for Monitoring	Method	Period and Frequency	Approx. Location	Institutional Responsibility	
						Implementation	Supervision
	• Leachate collection and treatment prior discharge to water body.			DLP	locations (1 treated leachate effluent, 2 ground water & 2 surface water)during DLP as directed by DSC. Continue after DLP.		
Operation and Closure of Quarries and Borrow Pits for construction material and cover material	• Finalize quarries and borrow pits sites. • Ensure located away from population centers, drinking water intakes. • Sides of excavation will have a slope not steeper than 1:4. • Structures will be provided for stable cut slope. • Adequate drainage to prevent ponding.	No evidence of water ponding. No increased visual turbidity of surface waters. Natural contour restored.	Direct observation	Regular during construction and operation	Location of selected quarries and borrow pits site	Contractor during construction and DLP. BSMC after DLP.	DSC, PIU / Municipality during construction and DLP. BSMC after DLP.
Leakage of Oil, Grease and other Material	• Restriction on use of fuel wood. • Storage at designated areas.	Hazardous materials management procedures implemented.	Direct observation and analysis	Regular during construction and operation.	Project area	Contractor during construction and DLP.	DSC, PIU / Municipality during construction

Table 8.3: Compliance Monitoring Plan

Predicted Impact	Mitigation Measures	Indicator for Monitoring	Method	Period and Frequency	Approx. Location	Institutional Responsibility	
						Implementation	Supervision
	• Accidental spills shall be cleared immediately. • provisions for collection and retaining leaks and spills.	No visible puddles of oil or oil contaminated soil.				BSMC after DLP.	and DLP. BSMC after DLP.
Labor Camp and Solid Waste Disposal Generated by Construction Workers	• Good Sanitary condition at labor camp. • Maintain discipline at labor, work camp and construction site.	No complaints from local stakeholders. Workers health condition assessment. Number of cases of disease at labor camp.	Direct observation	Regular during construction.	Labor camp area	Contractor	DSC, PIU / Municipality
Stockpiling of Construction and Cover Materials and Spoil Disposal	• Avoid haphazard debris disposal. • identify suitable sites for stockpiling and debris disposal with written permission from relevant stakeholders. • proper coverage of stockpiles with control on surface runoffs. • correct placement of	Sufficient protection measures provided against washouts. No increased visual turbidity of surface waters. Stability of spoil area. Complaints from local residence	Direct observation	Regular during construction and operation.	Location of identified stockpiling and debris disposal sites	Contractor during construction and DLP. BSMC after DLP.	DSC, PIU / Municipality during construction and DLP. BSMC after DLP.

Table 8.3: Compliance Monitoring Plan

Predicted Impact	Mitigation Measures	Indicator for Monitoring	Method	Period and Frequency	Approx. Location	Institutional Responsibility	
						Implementation	Supervision
	fill.						
Bad Smell	• Early transportation of solid waste covered properly. • Unloading, spreading, compaction and daily cover with clay material. • Shuffling of waste will be carried out when the wind blow is less.	No complaints from local stakeholders.	Direct observation	Regular during operation.	Project area	Contractor during DLP. BSMC after DLP.	DSC, PIU / Municipality during DLP. BSMC after DLP.
Fire Hazard due to Gas Generation, emission and Dispersion	• Provision of adequate number of fire extinguishers in case of the emergency. • Smoking will be strictly prohibited in the landfill site. • Provisions of trapping and flaring up of gases.	Cases of fire hazard Complaints from local stakeholders	Direct observation	Regular during operation.	Project area	Contractor during DLP. BSMC after DLP.	DSC, PIU / Municipality during DLP. BSMC after DLP.
Impact of Environment on the Project	• The project will ensure that all the waste carrying vehicles are properly covered and no littering of waste occurs while transportation to avoid disturbance from local people.	Complaints and obstruction from local stakeholders	Direct observation	Regular during operation.	Project area	Contractor during DLP. BSMC after DLP.	DSC, PIU / Municipality during DLP. BSMC after DLP.

Table 8.3: Compliance Monitoring Plan

Predicted Impact	Mitigation Measures	Indicator for Monitoring	Method	Period and Frequency	Approx. Location	Institutional Responsibility	
						Implementation	Supervision
Scattering of Waste by Rodents and Birds	• Ensure that the waste disposal, spreading and compaction operation will be carried out as soon as the wastes are unloaded. • The waste will be covered daily by clay material. • Special attention will be given for the waste brought in from the slaughter houses.	Incidence of scattering of waste.	Direct observation	Regular during operation.	Project area	Contractor during DLP. BSMC after DLP.	DSC, PIU / Municipality during DLP. BSMC after DLP.
Loss of Top Soil	• Mark out extent of clearing within approved worksite areas. • Restrict clearing to the marked areas and not to harvest any forest products for personal consumption or sale. • Stockpile cleared shrub foliage where possible at designated location for later use as brush layer. • Protect remaining vegetation within the proposed site. • Renewal of natural	No evidence of scouring and siltation.	Direct Observation	Regular during construction	Project area	Contractor during construction and DLP.	DSC, PIU / Municipality during construction and DLP.

Table 8.3: Compliance Monitoring Plan

Predicted Impact	Mitigation Measures	Indicator for Monitoring	Method	Period and Frequency	Approx. Location	Institutional Responsibility	
						Implementation	Supervision
	resources (i.e. seed sowing).						
2. Biological Environment							
Clearing of Vegetation and Compensatory Plantation	• Coordinate with concerned authority for proper felling, stacking and transportation of logs at designated locations. • Plantation and management for five years of around 7330 nos. of trees of appropriate species around buffer area.	Ensure appropriate felling and stacking of trees. Ensure appropriate plantation with protective measures. Survival rate of trees.	Direct observation	Regular during construction and operation.	Project area and buffer area/strip.	Contractor during construction and DLP. BSMC after DLP.	DSC, PIU / Municipality during construction and DLP. BSMC after DLP.
Birds Hazards	• Ensure that the waste disposal, spreading and compaction operation will be carried out as soon as the wastes are unloaded. • The waste will be covered daily by clay material. • Special attention will be given for the waste brought in from the slaughter houses.	Incidence of scattering of waste.	Direct observation	Regular during operation.	Project area	Contractor during DLP. BSMC after DLP.	DSC, PIU / Municipality during DLP. BSMC after DLP.
Aquatic Life – Water Pollution	• Proper construction waste disposal • Proper Leachate	Monitoring of provisions.	Measurement and analysis	Regular during Construction and Operation	Project area	Contractor during construction	DSC, PIU / Municipality during

Table 8.3: Compliance Monitoring Plan

Predicted Impact	Mitigation Measures	Indicator for Monitoring	Method	Period and Frequency	Approx. Location	Institutional Responsibility	
						Implementation	Supervision
	management			With frequency specified above under Physical and Chemical Environment.		and DLP. BSMC after DLP.	construction and DLP. BSMC after DLP.
3. Socio-economic and Cultural Environment							
Health and Sanitation	• Establish campsite for outside workers. • Camp site will have facilities such as drinking water supply, pit latrines and health clinics. • Proper collection, storage and compaction of the solid waste. • Daily cover over the cell. • Visits of animals like dogs, cats, rats in site will be controlled strictly and insects such as flies will be controlled to the extent possible by applying the chemicals.	No complaints from labor, workers and local residence. Workers health condition assessment.	Direct observation	Regular during construction and operation	Project area	Contractor during construction and DLP. BSMC after DLP.	DSC, PIU / Municipality during construction and DLP. BSMC after DLP.
Occupational Health and Safety	• Compliance with safety rules and regulations.	No complaints from labor, workers and local residence.	Direct observation	Regular during construction and operation	Project area, work and labour camp	Contractor during construction	DSC, PIU / Municipality during

Table 8.3: Compliance Monitoring Plan

Predicted Impact	Mitigation Measures	Indicator for Monitoring	Method	Period and Frequency	Approx. Location	Institutional Responsibility	
						Implementation	Supervision
	• Good sanitary condition at labor and work camp. • Maintain discipline at labor, work camp and construction site. • Placement of signboards and prohibition to outsiders at risk prone sites	Workers health condition assessment. Number of cases of disease and roadway accidents.			locations	and DLP. BSMC after DLP.	construction and DLP. BSMC after DLP.
Conflict between Local and Outsiders / Increase in Bad Habit due to Cash Flow	• Impose restrictions on certain activities in the social places so that workers do not become a nuisance to local people. • develop good relationship and understandings between local community and the project people	No complaints from local stakeholders	Direct observation	Regular During construction	Project area	Contractor during construction and DLP.	DSC, PIU / Municipality during construction and DLP.
Employment for Locals	• Locals will be given employment to the extent possible depending upon their qualification and availability.	Engagement of Locals in the project	Direct observation	Regular during construction and operation	Project area	Contractor during construction and DLP. BSMC after DLP.	DSC, PIU / Municipality during construction and DLP. BSMC after DLP.
Local	• Ensure that all the	Complaints and	Direct	Regular during	Project area	Contractor	DSC, PIU /

Table 8.3: Compliance Monitoring Plan

Predicted Impact	Mitigation Measures	Indicator for Monitoring	Method	Period and Frequency	Approx. Location	Institutional Responsibility	
						Implementation	Supervision
Disturbance in Transportation of Waste	waste carrying vehicles are properly covered and no littering of waste occurs while transportation. • Access road leading to landfill site will be well maintained.	obstruction from local stakeholders	observation	operation.		during DLP. BSMC after DLP.	Municipality during DLP. BSMC after DLP.
Rodents and Impact on Agro-Productivity	• Proper handling of Solid Waste i.e. collection, storage, laying, compaction, daily cover etc. • Visits of animals like dogs, cats, rats in site will be controlled strictly and insects such as flies will be controlled to the extent possible by applying the chemicals.	No complaints from local stakeholders.	Direct observation	Regular during operation.	Project area	Contractor during DLP. BSMC after DLP.	DSC, PIU / Municipality during DLP. BSMC after DLP.
Aesthetic Values, foul / Bad Odor	• Transportation of Solid Waste as early as possible and properly covered. • Daily cover of solid waste. • Creation of Buffer area/strip all around	No complaints from local stakeholders.	Direct observation	Regular during operation.	Project area	Contractor during DLP. BSMC after DLP.	DSC, PIU / Municipality during DLP. BSMC after DLP.

Table 8.3: Compliance Monitoring Plan

Predicted Impact	Mitigation Measures	Indicator for Monitoring	Method	Period and Frequency	Approx. Location	Institutional Responsibility	
						Implementation	Supervision
	with tree plantation.						
Reclamation of Landfill Site	• Upon saturation, the site will be developed as recreation ground which could be used by the local communities as well as people from Birgunj and Kalaiya.	Developed recreational ground.	Direct observation	After completion of landfill operation	Project area	BSMC	DUDBC

Note: BSMC = Birgunj Sub-Metropolitan City. DDC = District Development Committee. DLP = Defects Liability Period. DSC = Design and Supervising Consultant. DUDBC = Department of Urban Development and Building Construction. PIU/Municipality = Project Implementation Unit / Birgunj Municipality. RoW = Right of Way. VDC = Village Development Committee.

Table 8.4: Impact Monitoring Plan

Predicted Impact	Mitigation Measures	Indicator for Monitoring	Method	Period and Frequency	Approx. Location	Institutional Responsibility	
						Implementation	Supervision
1. Physical and Chemical Environment							
Land Stability and Soil Erosion	• Proper shoring work. • Minimize exposure of excavation work. • River bank protection • Grass seeding for embanked slopes and tree plantation in buffer area/strip • Removal of spoils as soon as possible and disposal of spoils in municipal approved site.	No trench slips No river bank erosion Survival rate of vegetative cover. Scouring and siltation	Direct observation	Regular during construction and operation	Project area	Contractor during construction and DLP. BSMC after DLP.	DSC, PIU / Municipality during construction and DLP. BSMC after DLP.
Noise Pollution	• Notification of construction work to local community. • Avoid project activity at night. • Minimize period of construction. • Ensure plant & equipment conforms to best practices. • Workers provided with appropriate ear muffs / plugs. • Provision of noise barriers	No complaints from local residence.	Direct observation	Regular during construction and operation.	Project area	Contractor during construction and DLP. BSMC after DLP.	DSC, PIU / Municipality during construction and DLP. BSMC after DLP.
Air Pollution	• Construction site	No excess dust	Direct	Regular during	Project area.	Contractor	DSC, PIU /

Table 8.4: Impact Monitoring Plan

Predicted Impact	Mitigation Measures	Indicator for Monitoring	Method	Period and Frequency	Approx. Location	Institutional Responsibility	
						Implementation	Supervision
	maintained damp by periodical spray of water. • All plying vehicles to comply GoN pollution regulation. • Ensue delivery vehicles be covered. • Cover stockpiled construction materials with tarpaulin. • Implement health and safety plan	deposition on crops and vegetation. No complaints from local residence. Monitoring of evidence issued by concerned agency.	observation	construction and operation.		during construction and DLP. BSMC after DLP.	Municipality during construction and DLP. BSMC after DLP.
Leachate Generation and Water Pollution	• Restrict debris disposal near water bodies. • Provision of toilets, good drainage, proper water supply and solid waste management within work and labour camp. • Prohibit washing machinery and vehicles in surface water. • Horizontal and vertical liners for to avoid ground water contamination.	No siltation. Monitoring of provisions. Physico-chemical and Microbiological tests to WHO standards conforming to test parameters carried out during baseline survey kept in Annex 8.	Direct observation Measurement and analysis	Regular during construction and operation phase. Water Quality Monitoring, every two months during construction and every month during DLP. Regular monitoring after	Project area Three sensitive locations (1 ground water & 2 surface water) during construction and five sensitive	Contractor during construction and DLP. BSMC after DLP. Through approved monitoring agency	DSC, PIU / Municipality during construction and DLP. BSMC after DLP. DSC, PIU / Municipality during construction and DLP. BSMC after DLP.

Table 8.4: Impact Monitoring Plan

Predicted Impact	Mitigation Measures	Indicator for Monitoring	Method	Period and Frequency	Approx. Location	Institutional Responsibility	
						Implementation	Supervision
	• Leachate collection and treatment prior discharge to water body.			DLP	locations (1 treated leachate effluent, 2 ground water & 2 surface water) during DLP as directed by DSC. Continue after DLP.		
Operation and Closure of Quarries and Borrow Pits for construction material and cover material	• Finalize quarries and borrow pits sites. • Ensure located away from population centers, drinking water intakes. • Sides of excavation will have a slope not steeper than 1:4. • Structures will be provided for stable cut slope. • Adequate drainage to prevent ponding.	No evidence of water ponding. No increased visual turbidity of surface waters. Natural contour restored.	Direct observation	Regular during construction and operation	Location of selected quarries and borrow pits site	Contractor during construction and DLP. BSMC after DLP.	DSC, PIU / Municipality during construction and DLP. BSMC after DLP.
Leakage of Oil, Grease and other Material	• Restriction on use of fuel wood. • Storage at designated areas.	Hazardous materials management procedures implemented.	Direct observation and analysis	Regular during construction and operation.	Project area	Contractor during construction and DLP.	DSC, PIU / Municipality during construction

Table 8.4: Impact Monitoring Plan

Predicted Impact	Mitigation Measures	Indicator for Monitoring	Method	Period and Frequency	Approx. Location	Institutional Responsibility	
						Implementation	Supervision
	• Accidental spills shall be cleared immediately. • provisions for collection and retaining leaks and spills.	No visible puddles of oil or oil contaminated soil.				BSMC after DLP.	and DLP. BSMC after DLP.
Labor Camp and Solid Waste Disposal Generated by Construction Workers	• Good Sanitary condition at labor camp. • Maintain discipline at labor, work camp and construction site.	No complaints from local stakeholders. Workers health condition assessment. Number of cases of disease at labor camp.	Direct observation	Regular during construction.	Labor camp area	Contractor	DSC, PIU / Municipality
Stockpiling of Construction and Cover Materials and Spoil Disposal	• Avoid haphazard debris disposal. • identify suitable sites for stockpiling and debris disposal with written permission from relevant stakeholders. • proper coverage of stockpiles with control on surface runoffs. • correct placement of fill.	Sufficient protection measures provided against washouts. No increased visual turbidity of surface waters. Stability of spoil area. Complaints from local residence	Direct observation	Regular during construction and operation.	Location of identified stockpiling and debris disposal sites	Contractor during construction and DLP. BSMC after DLP.	DSC, PIU / Municipality during construction and DLP. BSMC after DLP.
Bad Smell	• Early transportation of	No complaints from	Direct	Regular during	Project area	Contractor	DSC, PIU /

Table 8.4: Impact Monitoring Plan

Predicted Impact	Mitigation Measures	Indicator for Monitoring	Method	Period and Frequency	Approx. Location	Institutional Responsibility	
						Implementation	Supervision
	solid waste covered properly. • Unloading, spreading, compaction and daily cover with clay material. • Shuffling of waste will be carried out when the wind blow is less.	local stakeholders.	observation	operation.		during DLP. BSMC after DLP.	Municipality during DLP. BSMC after DLP.
Fire Hazard due to Gas Generation, emission and Dispersion	• Provision of adequate number of fire extinguishers in case of the emergency. • Smoking will be strictly prohibited in the landfill site. • Provisions of trapping and flaring up of gases.	Cases of fire hazard Complaints from local stakeholders	Direct observation	Regular during operation.	Project area	Contractor during DLP. BSMC after DLP.	DSC, PIU / Municipality during DLP. BSMC after DLP.
Impact of Environment on the Project	• The project will ensure that all the waste carrying vehicles are properly covered and no littering of waste occurs while transportation to avoid disturbance from local people.	Complaints and obstruction from local stakeholders	Direct observation	Regular during operation.	Project area	Contractor during DLP. BSMC after DLP.	DSC, PIU / Municipality during DLP. BSMC after DLP.
Scattering of Waste by	• Ensure that the waste disposal, spreading	Incidence of scattering of waste.	Direct observation	Regular during operation.	Project area	Contractor during DLP.	DSC, PIU / Municipality

Table 8.4: Impact Monitoring Plan

Predicted Impact	Mitigation Measures	Indicator for Monitoring	Method	Period and Frequency	Approx. Location	Institutional Responsibility	
						Implementation	Supervision
Rodents and Birds	and compaction operation will be carried out as soon as the wastes are unloaded. • The waste will be covered daily by clay material. • Special attention will be given for the waste brought in from the slaughter houses.					BSMC after DLP.	during DLP. BSMC after DLP.
Loss of Top Soil	• Mark out extent of clearing within approved worksite areas. • Restrict clearing to the marked areas and not to harvest any forest products for personal consumption or sale. • Stockpile cleared shrub foliage where possible at designated location for later use as brush layer. • Protect remaining vegetation within the proposed site. • Renewal of natural resources (i.e. seed sowing).	No evidence of scouring and siltation.	Direct Observation	Regular during construction	Project area	Contractor during construction and DLP.	DSC, PIU / Municipality during construction and DLP.
2. Biological Environment							

Table 8.4: Impact Monitoring Plan

Predicted Impact	Mitigation Measures	Indicator for Monitoring	Method	Period and Frequency	Approx. Location	Institutional Responsibility	
						Implementation	Supervision
Clearing of Vegetation and Compensatory Plantation	• Coordinate with concerned authority for proper felling, stacking and transportation of logs at designated locations. • Plantation and management for five years of around 7330 nos. of trees of appropriate species around buffer area.	Ensure appropriate felling and stacking of trees. Ensure appropriate plantation with protective measures. Survival rate of trees.	Direct observation	Regular during construction and operation.	Project area and buffer area/strip.	Contractor during construction and DLP. BSMC after DLP.	DSC, PIU / Municipality during construction and DLP. BSMC after DLP.
Birds Hazards	• Ensure that the waste disposal, spreading and compaction operation will be carried out as soon as the wastes are unloaded. • The waste will be covered daily by clay material. • Special attention will be given for the waste brought in from the slaughter houses.	Incidence of scattering of waste.	Direct observation	Regular during operation.	Project area	Contractor during DLP. BSMC after DLP.	DSC, PIU / Municipality during DLP. BSMC after DLP.
Aquatic Life – Water Pollution	• Proper construction waste disposal • Proper Leachate management	Monitoring of provisions.	Measurement and analysis	Regular during Construction and Operation With frequency specified above under Physical	Project area	Contractor during construction and DLP. BSMC after	DSC, PIU / Municipality during construction and DLP. BSMC after

Table 8.4: Impact Monitoring Plan

Predicted Impact	Mitigation Measures	Indicator for Monitoring	Method	Period and Frequency	Approx. Location	Institutional Responsibility	
						Implementation	Supervision
				and Chemical Environment.		DLP.	DLP.
3. Socio-economic and Cultural Environment							
Health and Sanitation	• Establish campsite for outside workers. • Camp site will have facilities such as drinking water supply, pit latrines and health clinics. • Proper collection, storage and compaction of the solid waste. • Daily cover over the cell. • Visits of animals like dogs, cats, rats in site will be controlled strictly and insects such as flies will be controlled to the extent possible by applying the chemicals.	No complaints from labor, workers and local residence. Workers health condition assessment.	Direct observation	Regular during construction and operation	Project area	Contractor during construction and DLP. BSMC after DLP.	DSC, PIU / Municipality during construction and DLP. BSMC after DLP.
Occupational Health and Safety	• Compliance with safety rules and regulations. • Good sanitary condition at labor and work camp.	No complaints from labor, workers and local residence. Workers health condition assessment.	Direct observation	Regular during construction and operation	Project area, work and labour camp locations	Contractor during construction and DLP. BSMC after	DSC, PIU / Municipality during construction and DLP. BSMC after

Table 8.4: Impact Monitoring Plan

Predicted Impact	Mitigation Measures	Indicator for Monitoring	Method	Period and Frequency	Approx. Location	Institutional Responsibility	
						Implementation	Supervision
	• Maintain discipline at labor, work camp and construction site. • Placement of signboards and prohibition to outsiders at risk prone sites	Number of cases of disease and roadway accidents.				DLP.	DLP.
Conflict between Local and Outsiders / Increase in Bad Habit due to Cash Flow	• Impose restrictions on certain activities in the social places so that workers do not become a nuisance to local people. • develop good relationship and understandings between local community and the project people	No complaints from local stakeholders	Direct observation	Regular During construction	Project area	Contractor during construction and DLP.	DSC, PIU / Municipality during construction and DLP.
Employment for Locals	• Locals will be given employment to the extent possible depending upon their qualification and availability.	Engagement of Locals in the project	Direct observation	Regular during construction and operation	Project area	Contractor during construction and DLP. BSMC after DLP.	DSC, PIU / Municipality during construction and DLP. BSMC after DLP.
Local Disturbance in Transportation of Waste	• Ensure that all the waste carrying vehicles are properly covered and no	Complaints and obstruction from local stakeholders	Direct observation	Regular during operation.	Project area	Contractor during DLP. BSMC after	DSC, PIU / Municipality during DLP. BSMC after

Table 8.4: Impact Monitoring Plan

Predicted Impact	Mitigation Measures	Indicator for Monitoring	Method	Period and Frequency	Approx. Location	Institutional Responsibility	
						Implementation	Supervision
	littering of waste occurs while transportation. • Access road leading to landfill site will be well maintained.					DLP.	DLP.
Rodents and Impact on Agro-Productivity	• Proper handling of Solid Waste i.e. collection, storage, laying, compaction, daily cover etc. • Visits of animals like dogs, cats, rats in site will be controlled strictly and insects such as flies will be controlled to the extent possible by applying the chemicals.	No complaints from local stakeholders.	Direct observation	Regular during operation.	Project area	Contractor during DLP. BSMC after DLP.	DSC, PIU / Municipality during DLP. BSMC after DLP.
Aesthetic Values, foul / Bad Odor	• Transportation of Solid Waste as early as possible and properly covered. • Daily cover of solid waste. • Creation of Buffer area/strip all around with tree plantation.	No complaints from local stakeholders.	Direct observation	Regular during operation.	Project area	Contractor during DLP. BSMC after DLP.	DSC, PIU / Municipality during DLP. BSMC after DLP.
Reclamation of Landfill Site	• Upon saturation, the site will be developed	Developed recreational ground.	Direct observation	After completion of	Project area	BSMC	DUDBC

Table 8.4: Impact Monitoring Plan

Predicted Impact	Mitigation Measures	Indicator for Monitoring	Method	Period and Frequency	Approx. Location	Institutional Responsibility	
						Implementation	Supervision
	as recreation ground which could be used by the local communities as well as people from Birgunj and Kalaiya.			landfill operation			

Note: BSMC = Birgunj Sub-Metropolitan City. DDC = District Development Committee. DLP = Defects Liability Period. DSC = Design and Supervising Consultant. DUDBC = Department of Urban Development and Building Construction. PIU/Municipality = Project Implementation Unit / Birgunj Municipality. RoW = Right of Way. VDC = Village Development Committee.

9. CONCLUSION AND RECOMMENDATION

9.1 Conclusion

Birgunj Municipality decided to develop solid waste resource processing centre at Masaharwa which is located in Bishrampur and Itiyahi VDC of Bara District near south-eastern boundary of Birgunj Municipality of Parsa District. The proposed sanitary land filling process at sanitary landfill in 10.76 ha paddy land is owned by the Birgunj Municipality. Geographically the site is suitable as the nearby settlement is far beyond 500 meters and Singaha river flows along the western border of the proposed site. This provides natural settings in discharge of treated leachate in natural drainage channel.

There is no environmentally sensitive area near to the proposed site. The nearest Parsa Wildlife Reserve is around 25 km far from the proposed site. Since there is no settlement nearby, nuisance to neighboring area due to foul order and influx of insects, rodents and public health hazard from odor, and disease transmitted by flies, insects, bird and rats will be insignificant.

As per site condition, the land filling methods and operations adopted is area method where filling operation of solid waste is carried out by building an earthen dam all around the proposed landfill cells as the terrain is unsuitable for the excavation of trenches in which to place the solid waste.

Anaerobic Sanitary Landfill system has been designed against Re-circulatory Semi-aerobic Sanitary Landfill system as the former is simple during operation and is less costly. There is no conveyance of air into the waste disposal area and the wastes decomposition is mainly in anaerobic condition. The decision to re-circulate leachate back into the landfill to promote rapid degradation of the waste was not made because of its operational complexity and literature on landfill operations indicate that there is no long term advantage for such a system.

Surface and ground water pollution from leachate is less likely because the land presently is used for flooded paddy indicating very low infiltration and the design includes leachate collection and treatment facility with placement of HDPE sheet liner and clay liner system at the bottom as well as along the vertical slope of waste storage dam to prevent leachate contaminating the ground and surface water. Methane and other gases will be generated as the waste degrades within the landfill mass. Gas collection facilities consists of collection wells and a flaring station depending upon the characteristics of the deposited waste after composting and other waste recovery and processing activities.

The probability of road blockage during construction period is very less as the site is located along rural setting with current low traffic flow. The positive aspect of the proposed site is that it is presently connected with existing gravel road to Ward 19 of Birgunj Municipality which is just around 1.5 km west of the proposed site.

In order to minimize the impact in nearby settlement, buffer area/strip has been proposed all around the landfill site with appropriate tree plantation within the buffer area/strip.

The experience of operational difficulty of other landfill site, the operation of this landfill site will also be not easy. The local people will use this site as the fulcrum to bargain for fulfillment of their demand. Hence a clear agreement will have to be made with the local community on the availability of the development fund against using their area.

The identified and predicted impacts have been evaluated to know their significance. A number of benefit augmentation measures and adverse impacts mitigation measures have been proposed to offset the adverse environmental impacts, and make the project environment-friendly. The mitigation measures will minimize the impacts sufficiently.

In order to ensure the implementation of the proposed mitigation measures, an environmental management plan has been developed which includes activities, staffing, budgeting and reporting.

Cost for environmental mitigation, monitoring and auditing have been proposed. Most of the mitigation costs are included as in-built in design and estimate. However, environmental management cost not included in in-built design and estimated separately to be included as part of the contractor's bill of quantity amounts to be NRs. 11,226,270.00 for the effective implementation of mitigation, monitoring and project auditing activities. This cost is about 2.34% of the total project cost that includes vat, price and physical contingencies.

9.2 Recommendation

The EIA report uses valuable information of the detailed design of the project. The design of the proposed project has considered lessons learnt from implementation of various landfill sites around the country.

The project will be implemented with strict adherence to the mitigation measures as prescribed in the Environmental Management Plan which is designed to form part of the Bidding Document so that the contractor's are compelled to implement them. The proposed environmental enhancement measures will help upgrade the quality of life of the affected people. Training and employment during construction will be crucial in enhancing livelihood of affected locals.

Taking into consideration the nature of the project, its location, evaluated environmental impacts and practical mitigation measures, including existing policies and laws on solid waste management and resource mobilization, and the environment, this project could be recommended for implementation. However, it is to be noted that proposed site is meant for the disposal of the municipal wastes only and hazardous waste shall not be entertained in the landfill site.

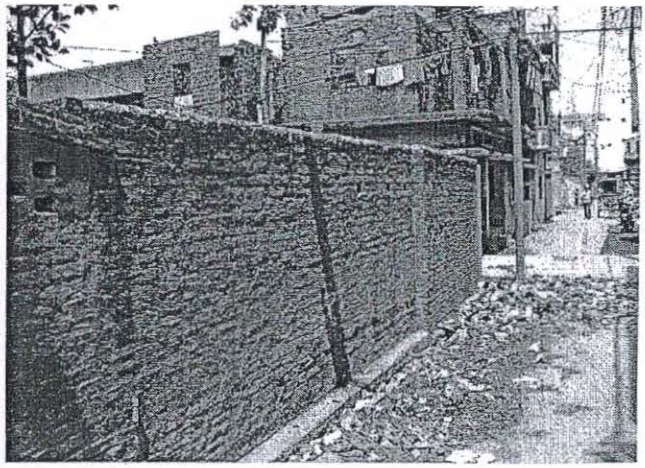
ANNEX 1

Approved Terms of Reference

Government of Nepal
Ministry of Urban Development
Department of Urban Development and Building Construction (DUDBC)

TERMS OF REFERENCE
ENVIRONMENTAL IMPACT ASSESSMENT
of
Sanitary Landfill Development for Improved Solid Waste Management of Birgunj Municipality

Bara and Parsa District

Proponent

Birgunj Sub-metropolitan City
Project Implementation Unit (PIU)
Secondary Towns Integrated Urban Environment Improvement Project (STIUEIP)
Birgunj, Parsa, Nepal

Submitted to

Ministry of Science, Technology and Environment
Through
Department of Urban Development and Building Construction
And
Ministry of Urban Development

Prepared by

SMEC International Pty Ltd., Australia in association with Brisbane City Enterprises Pty Ltd, Australia, CEMAT Consultants (P) Ltd., Nepal and Building Design Authority Nepal

July 2013

Table of Contents

List of Tables

List of Figures

Annexes

ABBREVIATIONS AND ACRONYMS

amsl	Above Mean Sea Level
CBOs	Community Based Organizations
DDC	District Development Committee
DDP	District Development Profile
DUDBC	Department of Urban Development and Building Construction
EA	Executing Agency
EIA	Environment Improvement Project
EMAP	Environmental Impact Assessment
EMP	Environmental Monitoring Plan
EPA	Environmental Protection Act
EPR	Environmental Protection Rules
GoN	Government of Nepal
IA	Implementation Agency
IEE	Initial Environmental Examination
Km	Kilometre
m	Meter
MoSTE	Ministry of Science, Technology and Environment
MoUD	Ministry of Urban Development
NGO	Non Government Organization
PAPs	Project Affected Peoples
PCO	Project Coordination Office
PIU	Project Implementation Unit
PMSC	Project Management and Support Consultant
PWD	Public Works Directives
PAPs	Project Affected Peoples
STIUEIP	Secondary Towns Integrated Urban Environment Improvement Project
SLF	Sanitary Landfill
SWM	Solid Waste Management
WWTP	Waste Water Treatment Plant
ToR	Terms of Reference
VDC	Village Development Committee

.Terms of Reference for
Environmental Impact Assessment (EIA) of
Sanitary Landfill Development for Improved Solid Waste Management of Birgunj Municipality

1. NAME AND ADDRESS OF THE PROPONENT PREPARING THE REPORT

1.1. The Proponent

Project Implementation Agency

Birgunj Sub-Metropolitan City
Project Implementation Unit (PIU)
Secondary Towns Integrated Urban Environment Improvement Project (STIUEIP)
Birgunj, Parsa, Nepal
Telephone: +977 51532186
Facsimile: +977 51521220
E-mail: stiueip.birganj@gmail.com

Project Execution Agency

Ministry of Urban Development (MoUD)

Co-ordination, Monitoring and Implementation

The Project Coordination Office (PCO) in Department of Urban Development and Building Construction (DUDBC) is responsible for overall coordination, monitoring and implementation of STIUEIP assisted by the Project Management Support Consultants (PMSC).

2. GENERAL INTRODUCTION OF THE PROPOSAL

2.1 Background

The Department of Urban Development and Building Construction (DUDBC), under the Ministry of Urban Development (MoUD), through the Government of Nepal, has received Loan 2650-NEP: Secondary Towns Integrated Urban Environmental Improvement Project (STIUEIP or the Project), from the Asian Development Bank (ADB). MoUD is the executing agency for the Project, working through DUDBC, and Birgunj municipality is the implementing agencies (IAs).

The Project will implement urban environmental improvement on an integrated basis including sewerage and drainage, solid waste and urban roads and lanes in the Birgunj municipality. It will also include:

- community development programs such as awareness-raising on health and hygiene;
- 3R (reduce, reuse, and recycle);
- investment in small-scale community facilities in the municipalities; and
- capacity strengthening of the municipalities and central government in the field of project management and operation.

The Project will be implemented over a five year period supported by the Asian Development Bank (ADB) through project loans. The EIA study covers the Solid Waste Management component of the subproject with development of Sanitary Landfill for Birgunj Sub-metropolitan City.

Birgunj Sub-Metropolitan City is Nepal's principal trade centre. The city has experienced rapid growth especially in the past decade, due to migration to the city from peripheral districts and VDCs for security reasons, or other reasons such as for a better livelihood. There is consequently environmental deterioration resulting from inadequate sanitation and drainage, and mounting traffic congestion mainly in the main road leading to poor air quality in the city. The individual institutional efforts of both the sub-metropolis and sectoral agencies in addressing these issues, has remained uncoordinated and grossly inadequate. Most of the fertile agricultural fields are rapidly converting into residential and commercial areas. The eastern part of the sub-metropolis which lies in the flood-prone area of the Singaha River is also being changed to residential and commercial areas due to pressure of an increase in the population in the sub-metropolitan city. Most buildings are being constructed in Wards 18 and 19. The infrastructural facilities such as solid waste, roads, sewer and storm-water drains and water supply, need to be developed to match the current rate of other development, which remains a major future concern.

Birgunj Sub-metropolitan City, PIU, STIUEIP has engaged the Design and Supervision Consultant to undertake Detailed Engineering Survey, Design and Construction Supervision for improvement/development of infrastructural facilities including Sanitary Land Fill for management of solid waste for Birgunj City including Environmental Impact Assessment, preparation of contract document for execution of the construction work..

2.2 Project Location and Existing Solid Waste Management Practice

The proposed Sanitary Landfill Site for Solid Waste Management of Birgunj Municipality lies in Itiyahi and Bishrampur VDC Ward No. 7 and 9 respectively of Bara District in Central Development Region of Nepal. The Singaha river located on the western part of the proposed sanitary landfill site touches Ward No. 19 of Birgunj Sub-metropolitan city. The proposed Sanitary Landfill site is linked with Birgunj via existing 1.0km gravel road from Ward No. 19 of Birgunj. The location of proposed solid waste management and landfill site is indicated in **Figure 2.1.**

Figure 2.1 Location Map of Proposed Solid Waste Management & Landfill Site

Birgunj Sub-Metropolitan City
Parsa District

Parsa District
Bara District
SINGHA HADI
Birgunj Sub-Metropolitan City
Proposed Landfill Site
Bara District
Proposed Sanitary Landfill Site
Singha Hadi
LEGEND
Ward Boundary
Trunk Sewer
Branch Drain
Sub Branch Drain
Surface Drain
STP Site
Sanitary Landfill Site
Highway/ Bridge
Metalled Road/ Bridge
Gravelled Road/ Bridge
Earthen Road/ Bridge
River/ Stream
Canal
Contour
Spot Height
नेपाल सरकार
भौतिक पूर्वाधार तथा वातावरण मन्त्रालय
सिंहदरबार, काठमाण्डौं

The proposed SLF with a total area of 11.13 ha is located in the Terai plain. Geographically it is located at 26°59'47" north latitude and 84°53'20" east longitude with average altitude of 80.5m.

The SWM component will adopt an integrated approach for solid waste management, with review and improvement of the entire system from segregation and collection, through 3R including focus on composting of organic waste, to transportation and final disposal at the sanitary landfill, and thus include procurement of necessary equipment and vehicles and the construction of a sanitary landfill site. Preliminary assessment has been made about the potential for utilizing the Clean Development Mechanism (CDM) for composting, and further studies will be undertaken during the detailed design stage.

Waste Generation and Composition

Survey data from 2011 stated a per-capita waste generation of 0.35 kg/cap/day as municipal average with a bulk density of 0.323 kg/l for Birgunj Sub-metropolis (ADB TA 7355-NEP, Institutional Strengthening of Municipalities, Final Report). For a projected population of 180,624 in 2011, the total municipal waste generation of Birgunj Sub-metropolis is estimated at 63.23 tons/day. This survey on waste generation and composition also gives the average physical composition of municipal solid waste in 2011 as follows:

Particular	Percentage (%)	Particular	Percentage (%)
Organic	51.09	Leather	0.41
Plastic	10.14	Metal	0.16
Paper	6.55	Rubber	0.10
Textile	4.65	Bones	0.05
Glass	1.66	Inerts	25.08
Others	0.11		

Technical/Operation Management

Under the support of PPPUE program of UNDP in Nepal, and as a new model for private sector involvement in rendering municipal services, Birgunj Sub-metropolis has recently (since September, 2011) contracted its SWM service in core areas of ward nos. 10 and 15 for a period of 5 years to a local NGO called "Sthaniya Agrasarta Bikash Sahayog Karyakram (LIDS)". The sub-metropolis sets its objective of extending SWM service with this concept in other wards too in near future, if it proves viable after close monitoring and evaluation of the private sector's performance.

In all other wards however, as before, the Sub-metropolis has been rendering regular municipal cleaning service in two shifts daily (i.e. morning and day shifts) at two different levels – municipal level and ward level. The municipal level service covers the area in and around main roads divided in 3 different routes, whereas the ward level service covers the area within the specific ward. During winter, working time of the morning shift is 06:30 – 10:30 and that of the day shift is 14:00-17:00. However, during summer, working time of the morning shift is 06:00 – 10:00 and that of the day shift is 14:00 - 17:00. City cleaning service coverage is about 60% by area. The municipal SWM service, at present, technically / operationally includes:

(a) City Cleaning

- the regular street / public space cleaning at municipal level along main roads, and at ward level along side roads/lanes within wards in their respective defined areas;
- cleaning of urban roadside drains and special drains by the municipal service; and

- collection of swept wastes together with waste heaps dumped by the public at traditional collection points along road sides (unfortunately also in roadside drains) by pick-up service using tippers and tractor-trailers.

(b) Collection and Transportation

- collection of household and commercial wastes dumped at certain designated public collection points (usually corners of road junctions) by *pick-up service* using tractor-trailers and tippers;
- collection of household and commercial wastes in some core areas by *door-to-door service* rendered by some *Tole Development Committees*, and
- transporting the wastes thus collected either to private disposal sites for filling lowlands upon request of the owners or to the present dump sites near custom office in ward nos. 2 and 19 close to the border to India.

It is reported that, collection of waste by container service was practiced some 5-6 years ago, however without success. The public container sites were always seen dirty, as wastes were thrown mostly outside the containers.

Average municipal waste collection was reportedly 30 tons/day in 2011. This shows that, although city cleaning service coverage is about 60% by area, by collected waste quantity however the service coverage is only about 47% (2011).

(c) Final Disposal

All collected solid wastes are finally disposed of either at private areas for filling lowlands upon request of the owners, or filling public lands of depressions, stagnant ponding areas, wetlands, or even along river banks within the municipal area. The lowlands, after gaining height by waste filling, are covered with soil as and when required. Through this practice, several dump sites have been changed into valuable lands for developing squatter settlement areas. Nevertheless, the present dump site near custom office in ward no.2 (close to the border to India) is still in operation, however with crude dumping practice.

(d) Composting

Composting of organic waste fractions is very little practiced within the municipal area, although the waste composition is favorable for composting. There is reportedly no communal composting at present, and even household composting is also negligible.

(e) Recycling

Despite high content on reusable/recyclables (e.g. paper, plastics, glass etc.) in the municipal waste stream, the Sub-metropolis, as such, is not at all involved in recovery of these waste fractions. Many scrap dealers are found to have settled their kawadi depots in and around along the roads to the custom office for their own private business on municipal solid waste.

Organizational Structure and Staffing

In the municipal organizational structure, staffing of sections and even of sub-sections with respective job descriptions remains mostly unclear. According to the current municipal organizational chart, two units (i.e. Solid Waste Collection Sub-section and Solid Waste Disposal Sub-section) are directly responsible for total solid waste management in the Sub-

metropolis. These sub-sections are organized under "Sanitation Section" of the "Environment and Sanitation Division".

Equipment / vehicles possessed by the Sub-metropolis for regular Solid Waste collection and disposal service and other sanitation / construction works includes Handcardts (40 nos.), Tricycle (14 nos.), Tractor trailer (14 nos., 3m^3 capacity), Tractor trailer (14 nos., 4 m^3 capacity), Tipper (6 m^3 capacity), Back hoe loader (1 no.) and Suction Tanker (2 nos., 3 m^3 cap). Among these all are in operating condition except for one Suction tanker though in high demand.

Financial Aspect

Annual expenditure of the Sub-metropolis in solid waste management service in the last fiscal year 2010/11 was reported to be 57.75 million NPR, and the expenditure in the current fiscal year is projected at 59.02 million NPR (2.2% higher compared to the last fiscal year). This expenditure seems to be very high for the coverage and quality of the service being provided. Expenditure analysis of the last fiscal year shows that ~65.2% of the total amount is expended in salary, 23.8% in allowances and other benefits, 6.2% in fuel and lubricants, 6.2% in repair & maintenance of equipment/vehicles, 1.3% in clothes/dresses for sweepers, and 0.9% in purchasing small equipment and tools (e.g. brooms, shovels, disinfecting materials etc.). It is however to be noted that there has been negligible revenue collection from the SWM service rendered by the Sub-metropolis, except that from septic tanks cleaning service.

2.3 Project Accessibility

Birgunj is quite accessible. It is linked with different places via the Tribhuvan Rajpath and East-West Highway. There are 115 km of black toped road, 83 km gravelled and 82 km earthen roads and a number of trails within the municipality. Overall roads in Birgunj are in a poor condition. Simara Airport is located about 22 km to the north of the city.

2.4 Impact Area Delineation

The subproject area impact zone for the EIA study has been divided into two parts on the basis of proximity and magnitude of the impact. They are "core subproject area" and the "surrounding areas" likely to be affected by the construction and operation of the proposed project. The core subproject area and surrounding areas are as defined below.

Core Subproject area

The core subproject area delineates area occupied by the project structures, facilities, waste collection and transportation areas as well as the area that will be impacted due to the construction and operation of the project and fenced off for safeguarding of various structures and facilities as well as the permanently acquired area by the project. The "core subproject area" includes areas occupied by the proposed Landfill site at Ward 7 and Ward 9 of Itiyahi and Bishrampur VDC respectively of Bara District and Birgunj Sub-metropolitan City area of Parsa District where collection and transportation of waste is carried out including area covering Ward 7 and Ward 9 of Itiyahi and Bishrampur VDC. These area is also defined as "Direct Impact Zone".

Surrounding Area

"Surrounding area" indicates a greater area, which will directly or indirectly be influenced by the implementation of the project. These area includes Boundary of Birgunj Sub-metropolitan

area of Parsa District and Itiyahi and Bishrampur VDC of Bara District where no project structure and facilities are located. These area is also defined as "Indirect Impact Zone".

2.5 Objectives of TOR

The principal objective of the TOR for the EIA of the Project are:

- to identify the general requirements for the EIA of the Subproject area;
- to define the main tasks for EIA investigations and reporting; incorporating the main issues identified during the scoping and the issues and concerns of the local people raised during the scoping meetings;
- to systematization of working procedure;
- to set out a time frame with required expert human resources for carrying out EIA study together with estimated budget required; and
- to provide guideline for the EIA.

2.6 Objectives of EIA

The primary objective of the EIA is to assess and inform decision makers about the potential environmental impacts of the proposed project and to suggest appropriate and pragmatic mitigation measures to mitigate and / or minimize the adverse impacts so that the Project can be implemented in an environmentally friendly manner.

The specific objective of the EIA are:

- to document important physical, biological, socio-economic and cultural baseline conditions of the subproject area;
- to identify, predict and assess the adverse and beneficial environmental impacts of the project in terms of magnitude, extent and duration during the project construction and operation phases;
- to suggest mitigation measures for the adverse impacts and enhancement measures for beneficial impacts;
- to familiarize various stakeholders with EIA outcomes through public consultation and participation programs and to incorporate their relevant concerns and issues in EIA report;
- to prepare environmental management, monitoring and auditing plans; and to provide sufficient information to decision makers about likely consequences of the project due to its implementation to make the final decision for the approval of the project.

2.7 Rationality for Conducting EIA

As per EPR 1997 and its subsequent amendments, EIA is mandatory for the proposed development of Sanitary Landfill as per clause details presented in Table 2.1.

Table 2.1: Environmental Study Requirements

Project Component	Study Requirement	EPR Clause No.	EPR Clause Statement
Solid Waste Management	EIA	Schedule 1, I1(a) Schedule 1, I1 (c)	• Requires IEE for land filling of waste ranging between 1000 – 5000 tons per year whereas EIA for greater than 5000 tons per year. • Requires IEE for land filling covering area between 5 to 10 ha.

Project Component	Study Requirement	EPR Clause No.	EPR Clause Statement
			• The proposed sanitary land filling process at sanitary landfill in 11.13 ha land at privately owned paddy land already acquired by the Municipality at Itiyahi and Bishrampur VDC of Bara District for Birgunj Municipality exceeds the required threshold value as the daily solid waste generation is estimated at around 12,572 tons per year at year 2016 and total solid waste of 254,312 tons will be filled in the land fill cells area of 4.92 ha during its 15 years life span i.e. year 2030 (DSC design report). Thus it exceeds the threshold value of land filling as well as landfilling area requiring EIA study.

Subsequently the EPR empowers the Ministry of Science, Technology and Environment (MoSTE) to approve the EIA report. This ToR has been prepared in accordance with the requirements of EPR Rule 5 and Schedule 4.

2.8 Features of Proposed Sub-project Component

The proposed subproject includes Solid Waste Resource Processing Facility and Sanitary Landfill to be developed on a 11.13 ha paddy land privately owned already acquired by Municipality at Itiyahi and Bishrampur VDC in Bara District, east of the Singaha River. The proposed SWM system includes waste collection from designated location and direct transportation to the sanitary landfill, construction / improvement of access road to the waste processing centre, development of buffer zone, landfill cells, administration facilities, composting facilities, receiving facilities, and parking areas, etc.

Table 2.2: Salient Features of Proposed Sub-project Component

Component	Function / Purpose	Description of Activities	Quantification of Construction Items / Activities	Location
SWM Component Solid Waste Resource Processing Facility and Sanitary Landfill	Establish basic level solid waste management system and improve urban environment	• Construction of boundary wall, processing shed and watchmen quarter and workers changing rooms / shower, waste deposit areas; • Construction of receiving ramps and loading bays, tree plantation, turfing and landscaping at solid waste transfer points; • Improvement of access roads including internal roads with metallic surface • Site clearance, surfacing and excavation • Construction of waste	Construction of solid waste resource processing centre in 11.13 ha land having total life span of 15 years beginning from year 2016 and ending in year 2030.	Privately owned paddy land of 11.13 ha already acquired by the Municipality in Ward 7 and Ward 9 of Itiyahi and Bishrampur VDC of Bara District. The nearest settlement from the

Component	Function / Purpose	Description of Activities	Quantification of Construction Items / Activities	Location
		deposit area, administrative buildings including health care facility for workers, watchmen quarter and generator house, segregation and processing shed, separate dedicated pit for medical waste, parking lot, weighbridge and vehicle wash, water supply distribution network, well, surface drainage, leachate drainage collection and sump tanks, leachate treatment unit, installation of site lights and fire extinguishers; • Landfill gas management facilities; • Waste composting facility area; • Waste recycling and material recovery facilities area; • Tree plantation, turfing and landscaping in solid waste processing site; • River training and bank protection in Singaha river including retaining walls for embankment protection of landfill cells. • Stock pile area for suitable clay, liner and cover material. • Operation of the landfill and also other waste management facilities (e.g. MRF, windrow composting facility with input/output design capacity) for the estimated life span of the ISWM site.		proposed SLF is Mushharwa in Bishrampur VDC which is 2km east of SLF and Itiyahi settlement located around 2km North East of SLF. Nagwa ward No. 19 of Birgunj Municipality is around 1km west of SLF connected by existing gravel road. The proposed SLF is around 3km south east from the Birgunj core area (Ghantaghar). The proposed SLF consists of agricultural land with sparse vegetation (concentrated at western side) constituting trees with girth ranging from 0.30m to 0.90m.

The Layout Plan of the proposed sanitary landfill is presented in **Figure 2.2**.

Waste Segregation, Storage and Volume Reduction at Source

The concept of volume reduction at the source shall be the first priority to be promoted by the solid waste management organization that is proposed to be established in the wards of Birgunj. Under the leadership of the City, all wards shall embark on a massive community awareness campaign (information, education and communication) and actively promote the reduction, recycling and reuse (3Rs) and minimization of wastes generated at the source. Responsibility for sorting and segregation of biodegradable and non-biodegradable wastes shall be at the household level, business, commercial, industrial and institutional centers, and in all other point source of solid wastes.

Waste Collection, Transport and Disposal at Sanitary Landfill

The objective is to organize and prepare a schedule that will collect, transport and dispose solid waste at Sanitary Landfill. Waste collection points shall be established at designated locations and transport routes established to increase the present collection service of the fleet of vehicles and trailers and target a collection service of 60%. The assessment of road conditions and coordinating new routes with municipality will be a priority activity to increase collection service.

The collection efforts will be coordinated with the ward leaders, the households and the NGOs who are working on the 3Rs as this would decrease their load and increase their efficiency. The concerted efforts are targeted to minimize waste generation and reduce waste at the source or at the points of generation.

Vehicles used for collection and transport of solid wastes shall have appropriate compartments to facilitate efficient storing of sorted wastes while in transit. The waste compartment shall have a cover to ensure the secure containment of solid wastes while in transit.

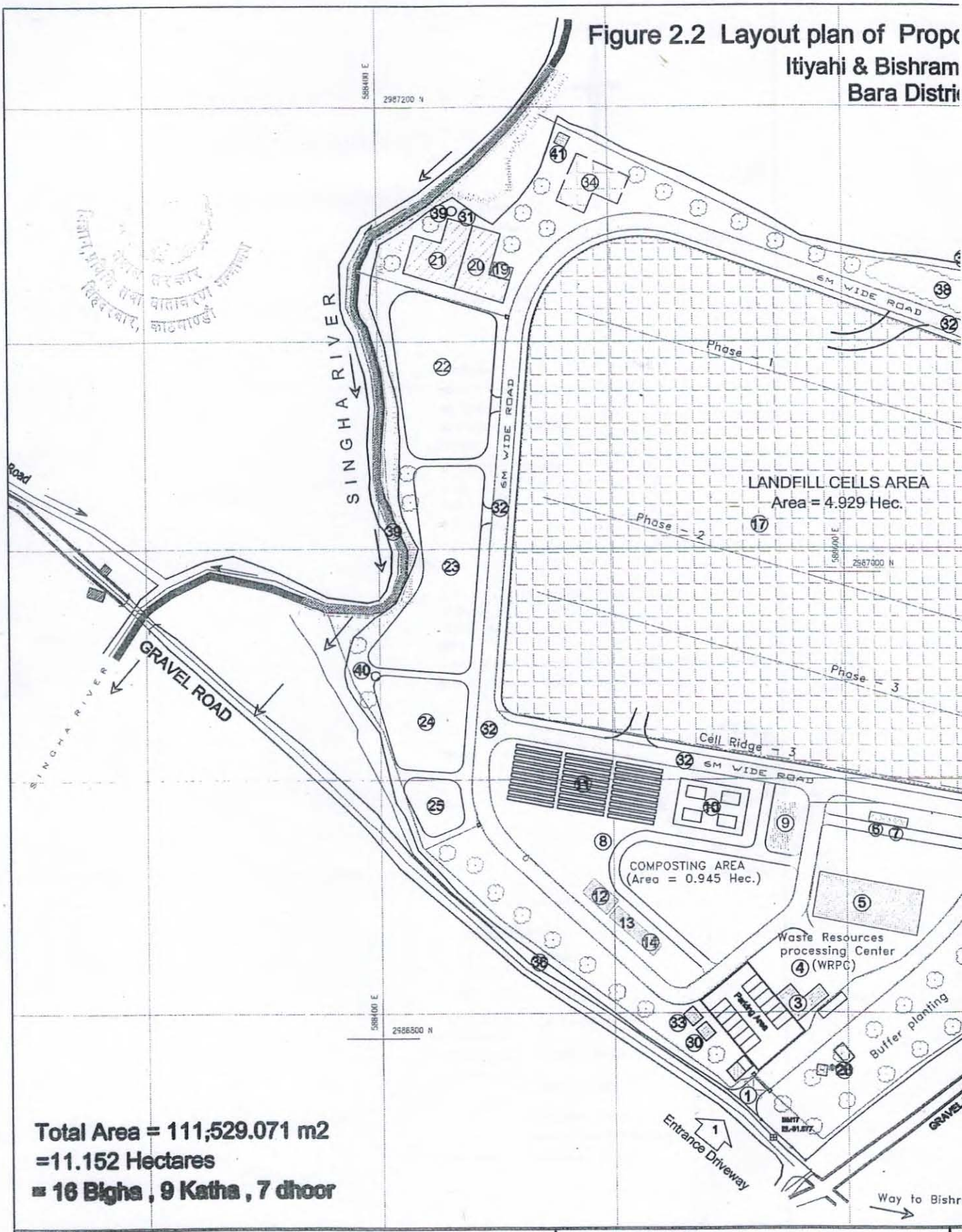
Wards shall be made organized to be responsible for the collection, segregation, recycling of biodegradable, recyclable, compostable and reusable wastes. The resulting residual wastes shall then be transferred to the waste resource processing center for composting and recycling at the Sanitary Landfill Site.

The City's waste collection vehicles coming from different wards of Birgunj shall bring the segregated recyclable wastes into the waste resources processing centre in the Sanitary Landfill site. Further the recyclables will be sorted and biodegradable will be separated that will go for composting. The remaining waste will then be dumped in designated landfill cells in a sanitary manner with daily cover of waste, proper management of leachate and gas.

Figure 2.2 Layout plan of Propo

Itiyahi & Bishram

Bara Distri



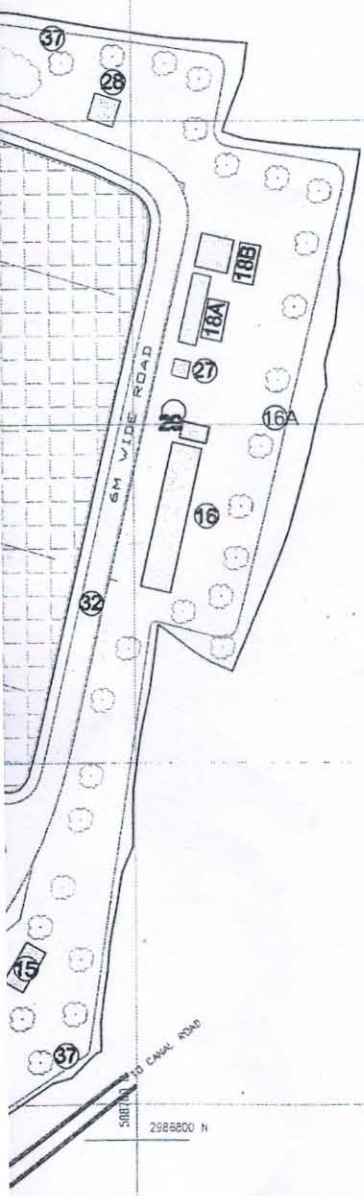
Total Area = 111,529.071 m2
=11.152 Hectares
= 16 Bighs , 9 Katha , 7 dhoor

Secondary Towns Integrated Urban Environmental Improvement Project (STIUEIP) Birgunj Sub-Metropolitan City , Nepal

Design & Supervision Consultant :

SMEC In Association with

ed Sanitary Landfill Site
ır VDC



Legend :

1.0 Entrance Gate
2.0 Waste Reception centre
3.0 Site Office/Administration Building
4.0 Waste Resources processing Center (WRPC)
5.0 Recyclable Storage Paper,Plastic,Glass,Metal
6.0 Staff Office (WRPC)
7.0 Hazardous (Residual) waste Room
8.0 Composting Center
9.0 Recyclables (non-compostable storage sheds)
10.0 Composting Reception Area
11.0 Windrow Compost Piles
12.0 Compost Maturation Bins
13.0 Post-harvest screening and packaging
14.0 Final Compost Product Storage
15.0 Staff/workers Changing Area & Quarters
16.0 Wokshop/Equipment depot and Washing Facilities
17.0 Landfill Cells Area Final Cover Plan
18.0 Landfill Cells Office Office and Covered Storage
19.0 Leachate Treatment Facility Office
20.0 Leachate Treatment Holding Tank
21.0 Leachate Treatment Plant Area (Future)
22.0 Anaerobic pond
23.0 Facultative pond
24.0 Maturation Pond
25.0 Sludge Drying Bed
26.0 Generator House and Electrical Room
27.0 Fuel storage Structure (3000-5000 liters)
28.0 Gas Management Facilities Future
29.0 Water Supply Pumping Station and Elevated Water Tank (Vehicle Water Facility)
30.0 Water Supply Pumping Station and Elevated Water Tank (Domestic)
31.0 Water Supply Facilities
32.0 Interior roads
33.0 Comunication facility
34.0 Health Care Waste Facility (Future)
35.0 Property Boundary fence
36.0 Frontage Boundary Wall
37.0 Surface Water Interception Canal
38.0 Daily Cover Stockpile Area
39.0 Monitoring Well # 1
40.0 Monitoring Well # 2
41.0 Security Watch Tower

Legend :

- Pond
- Tree
- Buildinding
- Gravel Road
- River Khola
- Proposed Road
- Barbed Wire Fencing
- Proposed Drain

r-9

DEVELOPMENT LAYOUT PLAN SANITARY LANDFILL SITE	Drawn By : G.P. Chaudhary Designed By : RM Miranda Checked By : N. Jha Approved By :	0 20 40 60m Scale 1:2000	Date : - Drawing No. Sheet No.

2.9 Construction Planning

2.9.1 Construction Schedule

The entire construction period is planned for completion within 24 months, beginning from September 2013 up to the end of August 2015. The post construction period (i.e. defects liability period) is planned from the beginning of September 2015 till the end of January 2016 that may extend further as necessitated which shall be the end of the project.

The full fledge construction will be affected during the monsoon season i.e. June, July and August when the rainwater will obstruct in smooth implementation of the project. This effect has been taken into account in preparing the schedule.

2.9.2 Project Infrastructures

The Implementation Schedule will also consider construction camps and facilities. In the vicinity of the Subproject area, labour camps could be built or rented accommodation shall be sought for the labors which shall have all basic requirements of health and sanitation.

Spoil Disposal Area: All unwanted excavated materials coming from the site of different Project components shall be disposed off in a systematic way in the designated spoil disposal areas. Some of the volume of excavated material might be useful for filling works behind retaining and other structures including landscaping at borrow areas etc.

Spoil deposits should be shaped into forms merging to the landscape.

Contractors' Temporary Camps: The camp will include workshops/mechanical yards, laboratories, construction materials, and equipment storage and maintenance areas. Separate areas will be allocated for laborers camp wherein due consideration for safe drinking water and sanitation facilities shall be made.

Quarries and Borrow Areas: It is highly likely to get the materials within chure range near amlekhgunj area located around 40 km north of Birgunj. These will be used to provide necessary construction materials for the construction works.

Engineers Camp: The Engineers camp and office will be at rented house in Birgunj city constituting guesthouse, laboratory, community centers, offices, and living quarters with safe drinking water, sanitation and communication facilities.

Emergency Medical Unit: In order to provide a firsthand emergency treatment to all the staffs, as and when required, a provision of a medical clinic is envisaged within the project site for emergency medical service. For further treatment, if so required, one can approach to the district hospital in Birgunj.

2.9.3 Construction Materials

The availability of construction material, the time required for their procurement, transport, processing and delivery has a big influence in the planning and scheduling of works at site. The major construction materials required for the construction which will be looked into for their availability, transport, storage and other aspects from project implementation purpose are as follows:

- Cement will be imported from India if local supply is inadequate;

- Sources for course and fine aggregates and clay materials will be explored. It is highly likely to get the materials within chure range near amlekhgunj area located around 40 km north of Birgunj.
- Reinforcement and structural steel will be imported from India if local supply is inadequate.

2.9.4 Major Construction Equipments

Some construction equipments envisaged for use during construction and operation phase will include mixer machines, loader, excavator, grader, vibratory roller, plate compactor, tipper trucks, bitumen distributor, bitumen boiler, asphalt paver, water tanker etc.

2.9.5 Human Resources

The maximum numbers of workers required for the proposed project during the peak period of construction is estimated to be approximately 150 in numbers. Local people will be given priority for employment as per their skill, experience and qualification in the project during the construction phase. Similarly, around 20-25 permanent jobs will be created during the operation phase of the project.

2.9.6 Construction Method

The major components of works related to the project will require pre/post qualification of contractors in order to execute project works under probably two separate package namely: i) Civil works of Sanitary landfill and ii) Supply and installation of equipment and plant. The construction will involve both machine and manpower.

3. DATA NEEDED FOR THE PREPARATION OF THE REPORT, AND PROCEDURE OF COLLECTING THEM

The EIA will be conducted in accordance with the requirements of the EPR 1997. The methodology described in the following sections shall be adopted to complete the EIA and its associated tasks.

3.1 Required Data and Information

The following information shall be collected or described in relation to physical, biological, socio-economic and cultural environment of the subproject area. The data of the Core Subproject area or Direct Impact Zone shall be site specific. Detailed documentation shall focus on those aspects likely to be changed through project implementation and shall include, but not be limited to the following physical, biological, socio-economic and cultural environments.

3.1.1 Physical and Chemical Environment

- Climate Data – temperature, rainfall and humidity of the subproject area;
- Air and noise quality in the subproject area;
- Land uses and land use pattern;
- Hydrological and geo-hydrological data;
- Geographical, Geological/geotechnical data of the subproject area;
- Spoil materials disposal – total volume, type, volume to be used for construction, disposable volume, etc; and
- Surface water quality (Singaha river) and ground water quality – physical, chemical and biological parameters.
- Water quality and aquatic diversity.

3.1.2 Biological Environment

The subproject area does not fall in any restricted areas, places of cultural, historical and archeological importance/monuments, conservation areas, wild life national parks, and any other places where the law of the land prohibits any construction activities. The already acquired 10 ha land by the Municipality is privately owned paddy land.

Flora

Clearance of minor vegetation and their type within the subproject area.

Wildlife

Mammals and birds in the subproject area.

3.1.3 Socio-economic and Cultural Environment

Indirect impact area (VDC and Municipality level information) and Direct impact area (Ward level information) in detail will be presented in EIA study report.

Social Features

- Demographic features: population distribution, gender composition, migration pattern, household size, caste and ethnicity;
- Religion and festivals;
- Education and skill level;

- Public health and sanitation conditions;
- Gender, women, children, the elderly, poor and ethnic minorities;
- Community infrastructures and services in the subproject areas;
- Local institutions and activities;
- Cropping pattern, practices and production
- Other development activities;
- Livestock raising;
- Crop loss.
- Settlements
- Employment
- Irrigation

Economic Features

- Local price information; land, and agriculture products, etc;
- Economy: occupation / employment, agriculture and livestock production, trade and commerce;
- Land ownership; list of landowners likely to be affected by land acquisition and resettlement;
- Income and expenditure of Project Affected Families (PAFs);
- Existing and planned development activities;

Cultural Features

- Places of Cultural Importance – historic, religious or cultural, and archeological importance sites in the project;
- Attitude of the local people to the development and to this project; and
- Cultural practices of the area.

3.2 Data Collection Procedures / Methods

Literature review, field survey (observation, inventory, household survey and key informant survey) and stakeholders meetings shall be used to collect data and information. The methodologies to be applied for the EIA shall be clear and specific for physical, biological, socio-economic and cultural environment. These methods are discussed below:

3.2.1 Desk Study and Literature Review

Available secondary information and literatures in the form of reports and maps will be collected and reviewed during the study. Some of the pertinent literatures to be reviewed during the study period includes;

- PPTA reports;
- Inception and design criteria report;
- Concept plan, preliminary plan, design, drawings etc. of the proposed project;
- District and VDC profile;
- Census data, 2001 published by Central Bureau of Statistics, GON;
- Topographical and land use maps of the area;
- EIA reports of similar projects.

Other required data and information will be collected from the Topographic Survey Department, Department of Forest and Soil Conservation, Agricultural Development Office, Central Bureau of Statistics (CBS), concerned District Development Committee (DDC),

Municipality and Village Development Committee (VDC), libraries and other concerned agencies.

3.2.2 Field Study

Field investigation for physical, biological, socio-economic and cultural environments will be carried out by the associate experts of EIA team and will be documented so as to create a dependable baseline database for impact assessment. Attention will be given to accommodate issues as contained, *inter alia*, in the National EIA Guidelines (1993), National EIA Guidelines for Solid Wastes Management Projects in the Municipalities of Nepal, 2005, other issues as contained in the Schedule 6 of the EPR.

Direct observation by the expert and field measurement methods will be employed for generating the physical database including meetings and interviews with knowledgeable persons of the local areas. Most of the physical environment data will be compiled from concept design of sanitary landfill site at Itiyahi and Bishrampur VDC.

Similarly, for biological database, vegetation surveys within the project site (though fewer) shall be conducted and plants species in the impact area shall be identified. The loss of few plants will be surveyed and estimated. The fauna in the area shall be identified through field observations and discussions. Sample of river water and ground water will be collected for laboratory analysis.

Required data and information on prevailing socio-economic conditions, quality of life, values and infrastructures will be collected through observation by experts, questionnaire tools, focus group discussions, stakeholders meetings and household surveys. Besides, key informants survey will also be carried out to gather pertinent information on socio-economic and cultural practices, education and skill at local level, use of community resources and facilities, problems and major issues, expected impacts and possible mitigation measures, local perception on the proposed project etc. Information on land acquisition and compensation issues will be collected. In summary, the socio-economic conditions will be acquired through HH survey, FGD or PRA, VDC/ward level meetings with key stakeholders, and key informant interviews (KIIs).

In addition, application of accepted tools of impact assessment by matrix method, suggestions and knowledge of the local people will also be taken into consideration for impact evaluation, recommending mitigation and monitoring the plans.

3.2.3 Public Consultation

Meetings and discussions will be held with the concerned people and the affected families and communities, the stakeholders as well as the local line agencies to solicit their comments regarding the implementation of the proposed project.

3.2.4 Analysis of Data

The data and information gathered from the field work will be compiled and analyzed to establish the relations between the environmental impacts and their mitigation measures. On the basis of data analyses, conclusions will be drawn on the resolution of environmental issues and enhancement of the environment of the subproject area. Field data shall be compiled and cross checked for errors and discrepancies, if any. All the data shall be compiled into a computerized database system.

3.2.5 Public Hearing

Public hearing program will be conducted at the appropriate location in the subproject area to inform the local communities and the stakeholders about the proposed project and to gather their opinions, comments and suggestions. A notice for the public hearing shall be published in a national daily newspaper. The notice of the public hearing will be given in advance to the local people through the concerned Municipality, VDCs, and other concerned agencies. An Executive Summary of the draft EIA report in Nepali language will be prepared and distributed to the participants.

The public hearing program will mainly focus on the findings of the draft EIA, provide information and the awareness about the project plans and programs, building up of mutual consensus on the implementation of the project, identification of key issues and consideration of these issues in the EIA report and in the project design. Public views, opinions and relevant issues raised in the program will be recorded.

3.2.6 Public Notice

At the final stage of EIA Study, a public notice of 30 days duration will be given in a national daily newspaper by MoSTE requesting individual or institutional stakeholders to provide their comments on the EIA report. Copies of the EIA report will be displayed at the project sites as well as different public places including some relevant libraries.

3.2.7 Consultation with Concerned Agencies

The following organizations will be consulted during the preparation of the EIA:

Central Level Agencies

Ministry of Science, Technology and Environment (MoSTE); Ministry of Urban Development (MoUD); Department of Urban Development and Building Construction (DUDBC); and other relevant Government Departments.

District Level Agencies

District Development Committee, District Survey Office, District Land Revenue Office, District Agriculture Development Office, District Soil Conservation Office, District Health Office, and other concerned district level agencies.

Local Level Organizations

Birgunj Sub-motropolitan City, VDCs, Schools, health posts, non-governmental organizations (NGOs), and other related organizations.

3.3 Impact Matrix

An impact matrix shall be developed and used to identify project impacts on physical, biological, socio-economic and cultural resources of the subproject area during the construction and operation phases of the project. Based on the information and assessment of the studies, project induced beneficial and adverse environmental impacts shall be identified. The impacts shall further be classified as *short term, medium term and long term* in terms of **DURATION**; *low, high and medium* in terms of **MAGNITUDE** and; *site specific, local and regional* in terms of **EXTENT**. The impacts shall also be categorized for the construction and operation phases.

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

The following policies, laws, acts, rules and manuals / guide / guidelines etc. shall be reviewed while undertaking EIA study.

4.1 Plan, Policies and Strategies

- Interim Constitution of Nepal, 2063 (2007)
- Three Years Interim Plan
- Environmental Policy and Plan
- Other relevant Policies

4.2 Laws

- Environmental Protection Act, 2053 (1996)
- Environmental Protection Rules, 2054 (1997)
- Solid Waste Management Act, 2011 and any SWM rules endorsed during EIA study
- Local Self Governance Act, 2055 (1999)
- Land Acquisition Act, 2034 (1977)
- Town Development Act, 1992 (2045)
- Soil and Water Conservation Act, 2039 (1982)
- Public Road Act, 1974
- The Labour Act, 2048
- Other relevant Laws
- Plant Protection Act

4.3 Guidelines and Manuals

- National EIA Guidelines, 2050 (1993)
- Environmental Management Guidelines, 1997 and the EIA Policy Document for the Road Sector (DOR, 1997 and 2000)
- Waste water management guideline.

4.4 Institutions

Local Institutions

- Birgunj Sub-metropolitan City
- Village Development Committee
- District Administration Office
- District Development Committee

National Institutions

- Ministry of Environment Science and Technology
- Ministry of Urban Development
- Department of Urban Development and Building Construction

4.5 Convention

- Convention on International Trade for Endangered Species (CITES) of Wild Fauna and Flora, 2032 (1973)
- The Convention on Biological diversity, 2050 (1992)
- Other relevant International Convention

5. PREPARATION OF THE REPORT

5.1 Time

The EIA study for the proposed project will be completed within 6 months upon obtaining approval for scoping and ToR. The time schedule with various tasks is shown in Table 5.1.

5.2 Estimated Budget

As IEE/EIA is part of DSC ToR, the budget for the study team is included in DSC Contract.

5.3 Necessary Experts

The following experts / specialist will be involved in the EIA:

- Environmental Specialist
- Solid Waste Management Expert
- Ecologist / Botanist / Zoologist
- Sociologist / Socio-economist
- Hydrologist / Hydro-geologist
- Engineering Geologist / Geotechnical Engineer
- Roads Specialist

To assist the EIA team, enumerators, surveyors shall be involved as per the requirement.

Table 5.1: Environmental Impact Assessment Schedule

S. No.	Activities	Schedule in Months																							
		1				2				3				4				5				6			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	Literature Collection and Review																								
2	Field Visit, Data Collection, Analysis, Prediction & Evaluation																								
3	Preparation of Environmental Management Plan																								
4	Preparation of Draft EIA Report																								
5	Preparation, Implementation of Public Hearing Program & Collection of Municipality / VDC Recommendation																								
6	Draft Final EIA Report Submission																								
7	EIA Report Approval and Finalization																								

6. SCOPE DETERMINED FOR THE PREPARATION OF THE REPORT

The scope determined for the preparation of the report are as follows:

6.1 Scope of EIA

The environmental issues of the proposed project shall be considered for the project structures and facilities covering the physical, biological and socio-economic & cultural environments. The issues likely to arise due to implementation of the proposed project are mentioned below.

6.1.1 Priority Issues

- soil erosion;
- Spoil disposal;
- Acquisition of land if any;
- Air, Water and Noise Pollution
- Bad Smell
- Local Employment; and
- Community Development.

6.1.2 Issues Raised by Stakeholders

The issues raised by the stakeholders of the subproject areas during the scoping process are presented in table 6.1 below:

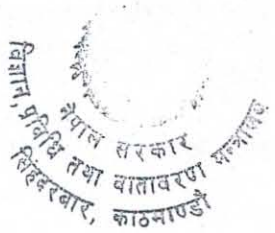
Table 6.1: Input from the Stakeholders

S. No.	Person/Institution & Address	Issues
1	Shom Prasad Chaurashiya Nagawa-19, Parsa	Employment opportunities to the affected locals (those whose land has been acquired) as per their skill.
2	Bihaya Dongol PIU, Municipality	Health care center for labour and their children.
3	Bishwanath Prasad Chaurashiya Auditor, Nagawa – 19, Parsa	• Some project contribution to the school. • Management of health care center in the neighborhood. • Construction of new bridge over Singaha river.
4	Promod Jha Vehicle Denter/Painter Nagawa - 19	Demand for a closed vehicle for transfer of waste.
5	Ramadhar P. Pal Bishrampur - 8	Employment opportunities for locals where the project is to be implemented.
6	Devlal P. Yadhav Bishrampur - 7	The fertilizer produced by the project should be distributed in a cheaper rate for the affected villages..
7	Anarjeet K. Yadhav Nagawa - 19	Demand for a periphery road around the landfill site.
8	Kadhi P. Chaurashiya Nagawa - 19	Demand for a well managed cemetery.
9	Madan P. Tula Nagawa - 19	An underground drainage should be constructed along the newly proposed Canal Road.
10	Mahabir P. Kanu Bishrampur - 6	Demand for a new bridge over Singaha river.

6.2 Issues Prioritized and Considered for the EIA

The Proponent shall prepare the EIA report considering but not limited to the following priority issues which are also included in the Scoping Report. The EIA study will assess the issues during project construction and operation stages and propose appropriate pragmatic mitigation measures. However, the survey shall not be limited to the one mentioned below, and any further issues identified during the course of the study shall be covered in detail.

6.2.1 Adverse Issues



6.2.1.1 Physical and Chemical Environment

(i) Construction Phase

- Landscape disturbance;
- Land stability and soil erosion;
- Air quality, water quality (ground and surface) and noise level;
- Operation of quarry and borrow pits;
- Drainage alteration and associated erosion; Demand for a new Bridge over Singaha river and an underground drainage along proposed Canal road. *(Issue raised by locals)*
- Leakage of oil, grease and other materials;
- Solid wastes disposal generated by the construction workers.
- River pollution and scattering of waste by rodents and birds.

(ii) Operation Phase

- Land stability and soil erosion;
- Surface water hydrology; Demand for a new Bridge over Singaha river and an underground drainage along proposed Canal road. *(Issue raised by locals)*
- Air quality;
- Leachate generation and risk on water quality (ground and surface water);
- Noise and vibration;
- Bad smell; Demand for a closed vehicle for transfer of waste. *(Issue raised by locals)*
- Gas generation, emission and dispersion;
- Availability of cover materials;
- Human health associated with environmental pollution.
- Impact of environment on the project.
- River pollution and scattering of waste by rodents and birds.
- Fire Hazard and access road pollution.

6.2.1.2 Biological Environment

(i) Construction Phase

- Clearing of vegetation

(ii) Operation Phase

- Bird hazard: scattering solid waste (bones, infectious materials etc.) by birds in the surrounding settlements.
- Aquatic life – water pollution

6.2.1.3 Socio-economic and Cultural Environment

(i) Construction Phase

- Loss of farm land, other category of lands as a part of site clearance;
- Issues on public/private utilities and access to them. Demand for a peripheral road and well managed cemetery; *(Issue raised by locals)*
- Increase in health and sanitation risk;
- Occupational health and safety; Health care center for labour and their children. *(Issue raised by locals)*
- Conflict between local community workers and outside construction workers;
- Increase in bad habit due to sudden cash flow.
- Employment for locals specifically project affected families. *(Issue raised by locals)*

(ii) Operation Phase

- Public health, Health and sanitation risk;
- Risk of disturbance by local people in transportation of waste;
- Risk of nuisance to neighbors due to lack or inadequate supply of water;
- Occupational health and safety. Health care center for workers and neighborhood. *(Issue raised by locals)*
- Employment for locals specifically project affected families. *(Issue raised by locals)*
- Rodents development/attraction and impact on agro productivity.
- Aesthetic values, foul/bad odour.
- Study on site recovery upon saturation of Landfill site capacity.

6.2.2 Beneficial Issues

(i) Construction Stage

- Employment opportunities to local people; *(Issue raised by locals)*
- Enhancement in technical skills and know-how;
- Increase in local economy such as business, rental of houses and its impact on local economy and;
- Increased mobility through improved project access and internal road. *(Issue raised by locals)*
- Demand for a well managed cemetery. *(Issue raised by the locals)*
- Projects contribution to the local school. *(Issue raised by locals)*

(ii) Operation Stage

- Employment generation to local people. *(Issue raised by locals)*
- Developed infrastructure for the disposal of solid waste in sanitary landfill will reduce environmental risk associated with health hazard.
- Improved environment, health and hygiene of the people reducing the risk of adverse environmental impacts associated with improved solid waste management system.
- Locals demand fertilizer in a cheaper rate from the project for the affected villages. *(Issue raised by locals)*

EIA study shall discuss about evaluation of the residual issues and their method of identification, evaluation and prediction.

7. IMPACT ON THE ENVIRONMENT OF THE IMPLEMENTATION OF THE PROJECT

The proponent shall identify and evaluate each project impact on the environment during the construction and operation phases. Each impact shall be evaluated as per the National EIA Guidelines, 1993 or the other standard methods, and shall be documented in the EIA report. The nature of impacts, such as direct or indirect, beneficial or adverse, reversible or irreversible, and their magnitude shall be identified in the EIA. The EIA shall assess impact categorized under **Magnitude** (high, medium, low), **Extent** (site specific, local and regional) and **Duration** (short term, medium term, & long term) using appropriate criteria and definitions.

The proponent shall also consider the cumulative impacts that might arise due to implementation of the project. A matrix including identified impacts shall be prepared by categorizing impacts in terms of physical, biological, socio-economic and cultural environment for all the project phases. The identification and assessment of impacts and significance analysis shall be conducted based on the professional judgment, National EIA Guideline 1993 etc.

The environmental dominates are listed below:

- Socio-economic and Cultural;
- Physical and Chemical;
- Biological.

8. OTHER ALTERNATIVES FOR THE IMPLEMENTATION OF THE PROPOSAL

The study shall document no action alternative and other possible alternatives of the project. In general, the following alternatives shall be considered:

- Design and Layout Planning
- Technology and Procedure of Operation
- Time Schedule and Raw Materials to be Used
- Do Nothing Alternative

9. MEASURES TO REMOVE ANY NEGATIVE IMPACT THAT MAY BE NOTICED WHILE IMPLEMENTING THE PROPOSAL

In order to avoid and or minimize adverse environmental impacts, cost effective and locally implementable mitigation measures will be included in the EIA Report. The EIA Report will also include compensatory, corrective and preventive measures as applicable. The report may also include augmentation measures to provide additional benefits rather than more mitigation of impacts. Furthermore, mitigation measures should be included for design, construction and operational stages, particularly to address physical, biological, socio-economic and cultural impacts as applicable. Mitigation measures will be included as a part of the **Environmental Management Plan** (EMP). These measures will be clearly set out in the EIA and the Contract Documents. EMP will specifically include:

- Environmental management action plan (EMAP)
- A matrix showing the identified impact and corresponding mitigation measure
- Estimated cost for mitigation
- Monitoring and evaluation

- Description of monitoring agency

The EMP shall be prepared in matrix form and shall be developed for the following phases.

- Construction Phase; and
- Operational Phase

The EIA shall propose organizations and agencies to be consulted while implementing mitigation programs.

Summary of Cost Benefit assessment shall be given which shall include the followings:

- Cost for Environmental Mitigation Measures
- Cost for Enhancement Measures,
- Cost for Other Social Support Programs and Corporate Social Responsibility (CSR),
- Cost for Environmental Monitoring,
- Total Project Cost; and Total Project Benefit, and
- Percentage of total Environmental Cost to the Total Project Cost.

10. PARTICULARS OF THE COST AND RETURNS OF THE PROPOSAL

The Proponent shall include cost for benefits augmentation and adverse impacts mitigation measures to the extent possible in the EIA report.

11. MATTERS TO BE MONITORED WHILE IMPLEMENTING THE PROPOSAL

Important monitoring parameters, schedule of monitoring and responsible agencies for monitoring for both construction and operational stages will be identified, included and well documented in the EIA report. Estimated cost for environmental monitoring should be included in the main report. Three basic types of monitoring discussed below will be included. Indicators specifying these monitoring types along with the schedule of monitoring will be given.

- **Baseline monitoring** : includes parameters which indicate the changes in the baseline environmental condition during the project construction, after the project completion or during operation and maintenance of the project
- **Impact monitoring** : includes parameters indicating the changes occurring due to the implementation of project
- **Compliance monitoring**: this employs periodic sampling or continuous recording of specific environmental quality indicators or pollution levels to ensure project compliance with recommended environmental protection standards.

11.1 Environmental Auditing

Environmental Auditing is an integral part of EPR, 1997, and is mentioned in its Chapter 2, Item 14. It obliges Ministry of Environment to conduct environmental auditing two years after the project is completed. During the study, an auditing plan should be prepared to assess the effectiveness of implemented mitigation measures. Furthermore, the type of auditing, auditing indicators, method of auditing and cost for conducting the audit shall also be included in the EIA Report.

12. RELEVANT INFORMATION, REFERENCE LISTS, ANNEXES, MAPS, PHOTOGRAPHS, TABLES AND CHARTS, GRAPHS AND QUESTIONNAIRES TO BE MONITORED AT THE TIME OF PREPARING THE REPORT

The proponent shall comply with all the requirements as mentioned in the EPR 1997 before submitting the EIA report for necessary approval. The EIA report shall adequately cover the aspects included in this TOR and mentioned in Schedule 6 of EPR 1997.

The conclusions of the EIA shall be drawn up and presented in a separate chapter. The recommendation of the study shall be clearly presented in the report.

The report shall include proof of public hearing and recommendations of the concerned Municipality and VDCs. It shall include relevant information, references, annexes, maps, photos, tables, charts, graphs and questionnaires, as applicable. A map showing the project layout shall also be included in it. Furthermore, references shall be given in the frame mentioned in item 13 of the Schedule 6 of the EPR. A clear linkage on baseline information, impacts, environmental protection measures, monitoring and auditing plans shall be maintained in the EIA report. The proponent shall also annex the approved Terms of Reference in the report.

13. REPORTING

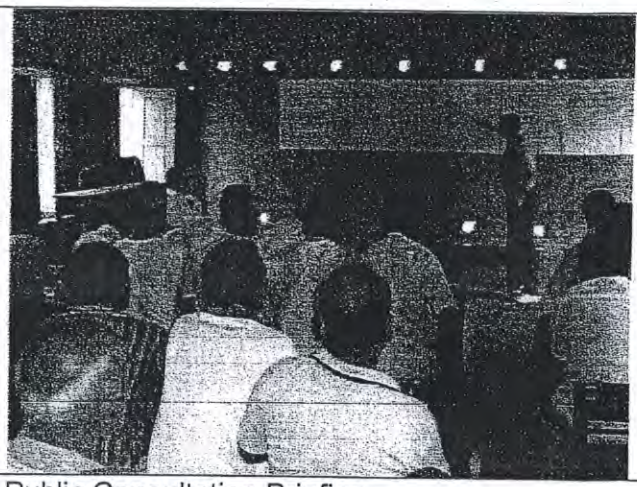
The Proponent shall submit fifteen (15) copies of the final EIA Report to the Ministry of Urban Development (MoUD) as per Rule 10 of EPR and for final approval from the Ministry of Science, Technology and Environment (MoSTE) as per Rule 11 of EPR.

REFERENCES

1. District Development Profile of Nepal, 2004.
2. PPTA Report.
3. Inception Report, Design Criteria Report and Concept Plan of the Project.
4. Nepal Development Information (NDI), 2006, Nepal District Profile, 2006, Kathmandu, Nepal.
5. Central Bureau of Statistics (CBS), June 2001, Population Census-2001, National Report, Kathmandu, Nepal.
6. Central Bureau of Statistics (CBS), Nov 2001, Population of Nepal, Population Census-2001, Village Development Committee / Municipality, Kathmandu, Nepal.
7. District & VDC Profile of Nepal published in 2013 by Intensive Study and Research Centre, Kathmandu, Nepal.
8. Village Development Committee Profile of Nepal published in 2010 by Intensive Study & Research Centre.
9. Uprety B.K., Environmental Impact Assessment: Process and Practice , Kathmandu, Nepal.

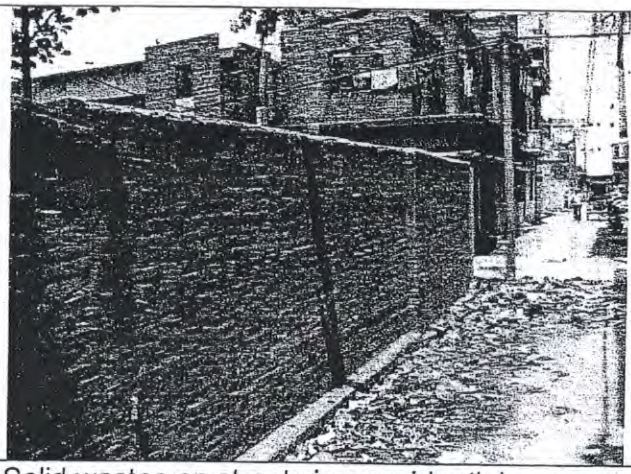
Project Photos

Public Consultation at Shree Nepal Rastriya Madhyamik Vidhyalaya, Nagawa-19, Parsa on September 18, 2012 (02/06/2069)

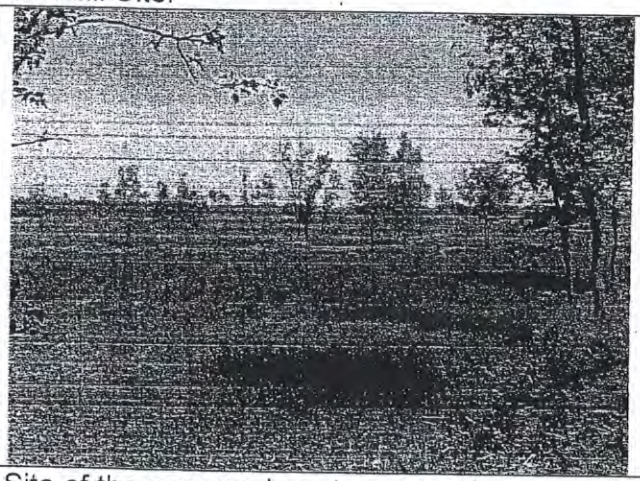


Public Consultation Briefing

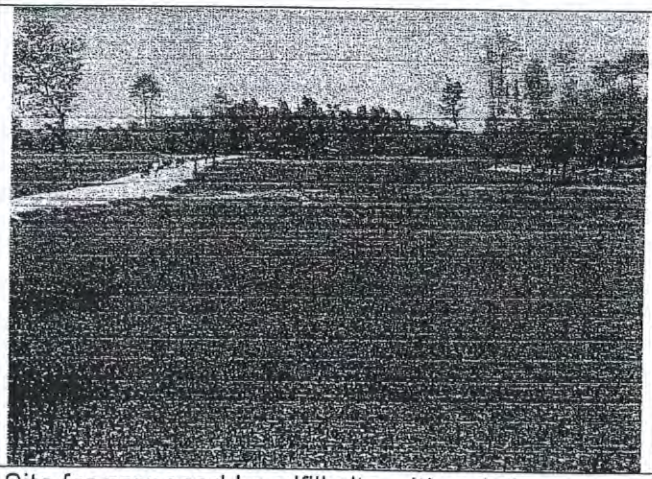
Site of the proposed Canal Road, looking towards the south leading to proposed Sanitary Landfill Site.



Solid wastes on streets in a residential areas at Ranighat, Birgunj



Site of the proposed waste processing centre at Itiyahi and Bishrampur VDCs, Bara District



Site for proposed Landfill site with existing access.

ANNEX 1

List of Study Team Members

List of SD/ToR Study Team Members

Name/Position in SD/ToR Study Team	Qualification	Area(s) of study in EIA
Mr. Nagendra Jha / Team Leader DSC - STIUEIP - Birgunj	M.E. Civil Engineering / Sanitation B.E. Civil Engineering	Overall Design and Supervision Team Leader
Mr. Sarad Raj Shrestha / Environmental Specialist (EIA Study Team Leader)	M.Sc. in Environmental Engineering B.Sc. Civil Engineering	SD/ToR Report Preparation
Mr. Ricardo Mate Miranda / Solid Waste Management Specialist (International)	B.Sc. CE, B.Sc. SE, MSc. Public Health	Engineering Design of Sanitary Landfill Site
Mr. Ramesh Kaji Tuladhar / Solid Waste Engineer	M.Sc. in Civil Engineering	Engineering Design of Sanitary Landfill Site
Mr. Uttam Kumar Bajracharya / Social Development Specialist	M.A. Political Science (Social Science)	Socio-economic and Cultural Environment

ANNEX 2

Checklist for Collection of Baseline Environment

1. Checklist for Topography / Physiography

S.No.	Location	Topographic Feature	Verification of Topographic Feature in the Field

2. Checklist for River Hydrology / Drainage Pattern

S.No.	Name of the River	Location	Drainage

3. Checklist for Ground / Spring Water Uses

Location	Ground Water Uses			Spring Water Uses		
	Drinking / Domestic Use	Irrigation	Others	Drinking / Domestic Use	Irrigation	Others

4. Checklist for River Water Uses

Name of River	Upstream			Downstream		
	Irrigation	Drinking / Domestic Use	Others	Irrigation	Drinking / Domestic Use	Others

Water Use Conflicts:

5. Checklist for Erosion and Land Stability

S.No.	Location	Extent	Erosion	Unstable Land	Remarks

6. Checklist for Landslides

S.No.	Location	Type	Extent	No. of Landslides

7. Checklist for Land Use

S.No.	Forest	Agriculture	Cultivated	Grassland	Barren	Others

8. Checklist for Historical, Cultural and Religious Shrines

No	Name of Shrines / Temples	Religious Significance	VDC / Ward No / Villages	Distance from Project Site

9. Checklist for Religious and Spiritual Traditions

No	Cremation Ghat		Key Festivals of the VDC People		Historic / Tourist Significance in the area
	Name	VDC / Ward No / Village	Name of the Festival	Observation day of the Festival	

10. Checklist for Water Quality Analysis – Ground and Surface Water

Parameters	Unit	Ground Water	Surface Water (Singaha River)	
		Nearby Tubewell	U/S of landfill	D/S of landfill
Physical				
P^H	-			
Colour	TCU			
Turbidity	NTU			
Conductivity	M mhos/cm			
Suspended Solids	Mg/l			
Dissolved Solids	Mg/l			
Chemical				
Magnesium Hardness	Mg/l			
Calcium Hardness	Mg/l			
Total Alkalinity	Mg/l			
Chloride	Mg/l			
Silica	Mg/l SiO_2			
Iron	Mg/l			
Manganese	Mg/l			
Calcium	Mg/l			
Magnesium	Mg/l			
Sulphate	Mg/l			
Nitrite	Mg/l as N			
Nitrate	Mg/l as N			
Arsenic	Mg/l			
Lead	Mg/l			
Cadmium	Mg/l			
Copper	Mg/l			
Zinc	Mg/l			
Sodium	Mg/l			
Potassium	Mg/l			
Nickel	Mg/l			
Chromium	Mg/l			
Mercury	Mg/l			
Dissolved Oxygen	Mg/l			
Chemical Oxygen Demand	Mg/l			
Total Coliform, (MPN Index/100ml)	Cfu/100 ml			

11. Checklist for Noise Level Measurement

SN	Location	Activity	Noise Level in dBA	Remarks

Note: dBA = Decibel unit of Sound pressure level

12. Checklist for Vegetation to be Affected

SN	Ward No.	Detail of Vegetation	Girth (m)	Approx. Height

13. Checklist for Flora of the Project Area

S.No.	Scientific Name	Local Name	Observation Site	Family	Type

14. Checklist for Mammals of the Project Area

S.N.	Local Name	Common Name	Scientific Name	Conservation Status		
				CITES Appendix	IUCN Red List	GoN

15. Checklist for Reptiles and Amphibians of the Project Area

S.N.	Local Name	Common Name	Scientific Name	Conservation Status		
				CITES Appendix	IUCN Red List	GoN

16. Checklist for Birds and Butterfly in the Project Area

S.N.	Family	Name of Bird/Butterfly	Scientific Name

17. Checklist for Industries/Settlements in the Project Area

No	Name of Industry/Settlements	Location: VDC / Ward No / Village etc.	Distance from Project Site

ANNEX 3

Focus Group Discussion

SECONDARY TOWNS INTEGRATED URBAN ENVIRONMENT IMPROVEMENT PROJECT
(STIUEIP)
BIRGUNJ SUB-METROPOLITAN CITY
Sanitary Landfill for Improved Solid Waste Management

PUBLIC CONSULTATION AND FOCUS GROUP DISCUSSIONS

Attendance Sheet

Venue: Landfill Site, Itiyahi 7 and Bishrampur 9, Bara
Date: 2070/8/13 November 28, 2013

S. No.	Name	Gender	Address/Occupation	Signature
१	गौरीशंकर यादव	पुरुष	कृषी बिरगन्ज-१९, नगवा	गौरी
२	प्रभुराम महरा	"	"	प्रभु
३	दिपेन्द्र कुमार पटेल	"	मेकानिकस/कृषी बिरगन्ज-१९ नगवा	दिपे
४	[illegible] कुमार पटेल	"	विश्रामपुर गा.वि.स ८ बारा व्यापार	[illegible]
५.	हृदय नारायण साह तेली	"	विश्रामपुर गा.वि.स. ९ बारा कृषि	हृदय
६.	गजेन्द्र शाह राउ	"	विश्रामपुर गा.वि.स ८ बारा कृषि	
७.	शेख समसुल	"	विश्रामपुर गा.वि.स ९ बारा व्यापार	[illegible]
८.	विर बहादुर पण्डित	"	विश्रामपुर गा.वि.स ९ कृषि बारा	विरबहादुर पंडित
९.	सन्तोष कुमार पण्डित	"	विश्रामपुर गा.वि.स ९ रोजगार बारा	[illegible]
१०.	~~[illegible]~~ राजकुमार प्रसाद शाह	"	विश्रामपुर गा.वि.स ९ बारा विद्यार्थी	राजकुमार

नेपाल सरकार
विज्ञान, प्रविधि तथा वातावरण मन्त्रालय
सिंहदरबार, काठमाण्डौ

SECONDARY TOWNS INTEGRATED URBAN ENVIRONMENT IMPROVEMENT PROJECT (STIUEIP)

BIRGUNJ SUB-METROPOLITAN CITY

Sanitary Landfill for Improved Solid Waste Management

PUBLIC CONSULTATION AND FOCUS GROUP DISCUSSIONS

Issues Raised

Venue: Landfill Site, Itiyahi 7 and Bishrampur 9, Bara

Date: 2070/8/13 (November 28, 2013)

S.No.	Issues / Comments from the Participants	Joint recommendations by the Participants and DSC Consultant
1.	The local people should be given opportunity for employment.	Provision has been made in the project to give priority to the local people for employment to the extent possible depeding upon their skill and capacity.
2.	Priority be given for employment to the local people.	Provision has been made in the project to give priority to the local people for employment to the extent possible depeding upon their skill and capacity.
3.	There should be proper management in transporation of solid waste so that spread of odour and smell could be minimized.	• All the vehicles carrying solid waste will be properly covered. • Every day's solid waste will be collected immediately, separated, laid, spread, covered by soil and compacted in the landfill cells. • Buffer zone will be developed all around the landfill site with tree plantation for attenuation of odour and smell.
4.	• Collection and disposal of solid waste should be done properly. • The solid waste management should be done as such that there is minimum chance of spread of disease. • The existing earthen road should be upgraded to sealed surface.	• The project's solid waste management provisions proper collection and disposal of waste in the sanitary landfill in the engineered manner. • The sanitary landfill includes engineering management of solid waste giving due regards in minimization of spread of disease. • The design drawing includes provision for upgrading of existing earthen road to sealed surface.
5.	• Littering of solid waste should be avoided while transportation.	• All the vehicles carrying solid waste will be properly covered.

SECONDARY TOWNS INTEGRATED URBAN ENVIRONMENT IMPROVEMENT PROJECT
(STIUEIP)
BIRGUNJ SUB-METROPOLITAN CITY
Sanitary Landfill for Improved Solid Waste Management

PUBLIC CONSULTATION AND FOCUS GROUP DISCUSSIONS

Attendance Sheet

Venue: Birgunj Sub Metropolitan City - 19, Nagwa Ward office

Date: 2070/8/13 November 28, 2013

S. No.	Name	Gender	Address/Occupation	Signature
१	[illegible]	पु	[illegible]	
२	[illegible]	पु	[illegible]	
३	[illegible]	पु	[illegible]	
४	[illegible]	पु	[illegible]	
५	[illegible]	पु	[illegible]	
६	[illegible]	पु	[illegible]	
७	[illegible]	पु	[illegible]	

SECONDARY TOWNS INTEGRATED URBAN ENVIRONMENT IMPROVEMENT PROJECT (STIUEIP)

BIRGUNJ SUB-METROPOLITAN CITY

Sanitary Landfill for Improved Solid Waste Management

PUBLIC CONSULTATION AND FOCUS GROUP DISCUSSIONS

Issues Raised

Venue: Birgunj Sub-Metropolitan City 19, Nagwa Ward Office, Parsa

Date: 2070/8/13 (November 28, 2013)

S.No.	Issues / Comments from the Participants	Joint recommendations by the Participants and DSC Consultant
1.	The project should minimize odour and smell.	• All the vehicles carrying solid waste will be properly covered. • Every day's solid waste will be collected immediately, separated, laid, spread, covered by soil and compacted in the landfill cells. • Buffer zone will be developed all around the landfill site with tree plantation for attenuation of odour and smell.
2.	Priority be given for employment to the local people.	Provision has been made in the project to give priority to the local people for employment to the extent possible depeding upon their skill and capacity.
4.	Minimization of accidents and medical treatment to workers.	• In order to minimize the unwanted accidents and possible effect of dust and gaseous emission to construction workers, the project will ensure adequate safety measures such as provision of helmets, masks, air plugs, road signs, warning signals and fire extinguishers etc. • The construction site will have a provision of health clinic along with necessary medicines for immediate treatment in case of any accidents.
5.	Presently a security guard namely Mr. Mahendra Raut Kurmi is employed for the security of proposed landfill site. He should be given continuity during Project's implementation.	Provision has been made in the project to give priority to the local people for employment to the extent possible depeding upon their skill and capacity.
6.	The project should be implemented as soon as possible.	The project is in its final shape for tendering. It will be implemented as soon as tendering and evaluation process is over.

ANNEX 4

Public Deed of Enquiry Public Hearing Meeting

(Public Notice and Muchulka of the Public Notice)

ANNEX 4

Public Deed of Enquiry Public Hearing Meeting

(Public Notice and Muchulka of the Public Notice)

नेपालमा सर्वाधिक बिक्री हुने राष्ट्रिय दैनिक

कान्तिपुर

काठमाडौं, विराटनगर, भरतपुर र नेपालगञ्जबाट एकैसाथ प्रकाशित

मक्तौला शहर एकिकृत शहरी वातावरण सुधार आयोजना
आयोजना कार्यान्वयन इकाई
वीरगंज उपमहानगरपालिका
वातावरणीय प्रभाव मूल्याङ्कन (EIA) प्रतिवेदन उपर
सार्वजनिक सुनवाई कार्यक्रम सम्बन्धी

सार्वजनिक सूचना

(प्रथम पटक सूचना प्रकाशित मितिः २०७०।०८।२६)

एशियाली विकास बैंकको सहयोगमा नेपाल सरकार, शहरी विकास मन्त्रालय, मक्तौला शहर एकीकृत शहरी वातावरण सुधार आयोजना, आयोजना कार्यान्वयन इकाई, वीरगंज उपमहानगरपालिकाद्वारा वीरगंज उपमहानगरपालिकाको फोहोरमैला व्यवस्थापन कार्ययोजना अन्तर्गत बारा जिल्लाको इटियाही र विश्रामपुर गा.वि.स. को क्रमशः वडा नं. ७ र ९ मा अवस्थित ११.१३ हेक्टर क्षेत्रमा सेनीटरी ल्याण्डफिल्ड साईट निर्माण तथा संचालन गर्ने प्रस्ताव गरिएको छ । सो आयोजना निर्माण तथा संचालनका लागि विस्तृत अध्ययन सम्पन्न गरी वातावरणीय प्रभाव मूल्याङ्कन (EIA) को अध्ययन कार्य भईरहेको छ ।

आयोजना संचालन गर्दा भौतिक, रासायनिक, जैविक, सामाजिक, आर्थिक र सांस्कृतिक वातावरणमा पर्न सक्ने प्रभावका बारेमा वातावरण संरक्षण ऐन २०५३ र वातावरण संरक्षण नियमावली २०५४ बमोजिम तयार पारिएको वातावरणीय प्रभाव मूल्याङ्कन (EIA) प्रतिवेदन उपर निम्न मिति, स्थान र समयमा हुने सार्वजनिक सुनुवाईको कार्यक्रममा सम्बन्धित सबै सरोकारवालाहरु उपस्थित हुनुभई छलफलमा सहभागिताका लागि हार्दिक अनुरोध गरिन्छ ।

कार्यक्रम:
मिति : २०७० साल पौष ६ गते, शनिवार
स्थान : श्री नेपाल राष्ट्रिय माध्यमिक विद्यालय, नगवा-१९
जिल्ला : पर्सा
समय : बिहानको ११ बजे

प्रार्थी
आयोजना कार्यान्वयन इकाई
मक्तौला शहर एकीकृत शहरी वातावरण सुधार आयोजना
वीरगंज उपमहानगरपालिका
वीरगंज, पर्सा, नेपाल

(Sample Letter for Pasting of Public Notice)

मितीः

श्री .....

.....

.....

विषय : सार्वजनिक सूचना टाँस गरिएको वारे ।

महोदय,

एशियाली बिकास बैंकको सहयोगमा नेपाल सरकार, शहरी बिकास मन्त्रालय, मध्यौला शहर एकिकृत शहरी वातावरण सुधार आयोजना, आयोजना कार्यान्वयन इकाई, बीरगंज उपमहानगरपालीका बाट कान्तिपुर दैनिकमा प्रथम पटक मिती २०७०।०८।२६ मा प्रकाशित भएको बीरगंज उपमहानगरपालीकाको फोहोर मैला व्यवस्थापन कार्य योजना अर्न्तगत बारा जिल्लाको इतियाही र बिश्रामपुर गा.बि.स. मा अवस्थित ११.१३ हेक्टर क्षेत्रमा सानीटरी ल्याण्डफिल्ड साईट निर्माण तथा संचालन गर्ने आयोजनाको वातावरणीय प्रभाव मूल्याङ्कन (EIA) प्रतिवेदन उपर सार्वजनिक सुनवाई कार्यक्रम सम्वन्धि सार्वजनीक सूचनाको प्रतिलिपी त्यहाको कार्यालयको सूचना पाटीमा टाँस गरेको व्यहोरा संलग्न मुचुल्कामा सहिछापगरी सहयोग गरिदिनुहुन हार्दिक अनुरोध गर्दछु ।

भवदीय

.....

नागेन्द्र झा
Team Leader
DSC
STIUEIP, Birgunj

(Sample Letter – Invitation on Public Hearing Program)

मितीः

श्री .....
.....
.....

विषय : सार्वजनिक सूनवाई कार्य्क्रम ।

महोदय,

एशियाली बिकास बैंकको सहयोगमा नेपाल सरकार, शहरी बिकास मन्त्रालय, मभ्फौला शहर एकिकृत शहरी वातावरण सुधार आयोजना, आयोजना कार्यान्वयन इकाई, बीरगंज उपमहानगरपालीका द्वारा बीरगंज उपमहानगरपालीकाको फोहोर मैला ब्यवस्थापन कार्य योजना अर्न्तगत बारा जिल्लाको इतियाही र बिश्रामपुर गा.बि.स. मा अवस्थित ११.१३ हेक्टर क्षेत्रमा सानीटरी ल्याण्डफिल्ड साईट निर्माण तथा संचालन गर्न वातावरणीय प्रभाव मूल्याङ्कन (EIA) को प्रतिवेदन उपर सार्वजनिक सुनवाई कार्यक्रम सम्वन्धि मिती २०७०।०८।२६ को कान्तिपुर दैनिकमा सार्वजनीक सूचना प्रकाशित भैसकेको ब्यहोरा अवगतार्थ अनुरोध छ ।

सो सम्वन्धमा निम्न मिती, स्थान र समयमा हुने सार्वजनिक सुनवाई कार्यक्रममा यहाको कार्यालयबाट प्रतिनिधि पठाई सहभागी गराई दिनुहुन हार्दिक अनुरोध गर्दछु ।

कार्यक्रमः

मिति : २०७०।०९।०६
दिनः शनिबार
स्थान : श्री नेपाल राष्ट्रिय माध्यमिक विद्यालय, नगवा-१९
जिल्लाः पर्सा
समय : विहानको ११ बजे

भवदीय

.....
नागेन्द्र झा
Team Leader
DSC
STIUEIP, Birgunj

(Sample Letter – Invitation on Public Hearing Program)

मिती:

श्री .....
.....
.....

विषय : सार्वजनिक सूनवाई कार्यक्रम ।

महोदय,

एशियाली बिकास बैंकको सहयोगमा नेपाल सरकार, शहरी बिकास मन्त्रालय, मभ्फौला शहर एकिकृत शहरी वातावरण सुधार आयोजना, आयोजना कार्यान्वयन इकाई, बीरगंज उपमहानगरपालीका द्वारा बीरगंज उपमहानगरपालीकाको फोहोर मैला ब्यवस्थापन कार्य योजना अर्न्तगत बारा जिल्लाको इतियाही र बिश्रामपुर गा.बि.स. मा अवस्थित ११.१३ हेक्टर क्षेत्रमा सानीटरी ल्याण्डफिल्ड साईट निर्माण तथा संचालन गर्न वातावरणीय प्रभाव मूल्याङ्कन (EIA) को प्रतिवेदन उपर सार्वजनिक सुनवाई कार्यक्रम सम्वन्धि मिती २०७०।०८।२६ को कान्तिपुर दैनिकमा सार्वजनीक सूचना प्रकाशित भैसकेको ब्यहोरा अवगतार्थ अनुरोध छ ।

सो सम्वन्धमा निम्न मिती, स्थान र समयमा हुने सार्वजनिक सुनवाई कार्यक्रममा यहाको कार्यालयबाट प्रतिनिधि पठाई सहभागी गराई दिनुहुन हार्दिक अनुरोध गर्दछु ।

कार्यक्रम:

मिति : २०७०।०९।०६
दिन: शनिबार
स्थान : श्री नेपाल राष्ट्रिय माध्यमिक विद्यालय, नगवा-१९
जिल्ला: पर्सा
समय : विहानको ११ बजे

भवदीय

.....

नागेन्द्र झा
Team Leader
DSC
STIUEIP, Birgunj

मुचुल्का

वातावरणीय प्रभाव मुल्याङ्कन (EIA) प्रतिवेदन उपर
सार्वजनीक सुनवाई कार्यक्रम सम्बन्धि
मध्यौला शहर एकिकृत शहरी वातावरण सुधार आयोजना

एशियाली विकास बैंकको सहयोगमा नेपाल सरकार, शहरी विकास मन्त्रालय, मध्यौला शहर एकिकृत शहरी वातावरण सुधार आयोजना, आयोजना कार्यान्वयन इकाई, वीरगंज उपमहानगरपालीका बाट कान्तिपुर दैनिकमा प्रथम पटक मिती २०७०।०८।२६ मा प्रकाशित भएको वीरगंज उपमहानगरपालीकाको फोहोरमैला व्यवस्थापन कार्ययोजना अन्तर्गत बारा जिल्लाको इनिशाही र विश्रामपुर गा.वि.स. मा अवस्थित ११.१३ हेक्टर क्षेत्रमा सानीटरी ल्याण्डफिल्ड साईट निर्माण तथा संचालन गर्ने आयोजनाको वातावरणीय प्रभाव मूल्याङ्कन (EIA) प्रतिवेदन उपर सार्वजनीक सुनवाई कार्यक्रम सम्बन्धि सार्वजनिक सूचनाको प्रतिलिपी तल उल्लेखित कार्यालय/सार्वजनिक स्थलमा उल्लेखित मितीका दिन हामीहरुको रोहबरमा टासगरी यो मुचुल्कामा सिहछाप गरिदियौं ।

कार्यालय भएमा

क्र. सं.	कार्यालयको नाम	प्रमाणित गर्ने कर्मचारीको नाम	प्रमाणित गरेको मिती	प्रमाणि गर्ने कर्मचारीको सहि	कार्यालयको छाप
१	SIUEI Project	प्रमोद कुमार सिंह	06-01-20		
२	जिल्ला कृषि विकास कार्यालय, बारा	शिवीर चौधरी	06/01/20		
३	[illegible]	अधिकृत [illegible]	06/01/20		
४	[illegible]				06/01/20

सार्वजनीक स्थल भएमा

स्थलको नाम	उपस्थित व्यक्तिहरु	लिङ्ग	उमेर	ठेगाना	सहिछाप
	१.				
	२.				
	३.				
	४.				
	५.				
	६.				

नेपाल सरकार
वन, वातावरण तथा भू-संरक्षण मन्त्रालय
सिंहदरबार, काठमाण्डौं

मुचुल्का

वातावरणीय प्रभाव मूल्याङ्कन (EIA) प्रतिवेदन उपर
सार्वजनीक सुनवाई कार्यक्रम सम्बन्धि
मध्यौला शहर एकिकृत शहरी वातावरण सुधार आयोजना

एशियाली विकास बैंकको सहयोगमा नेपाल सरकार, शहरी विकास मन्त्रालय, मध्यौला शहर एकिकृत शहरी वातावरण सुधार आयोजना, आयोजना कार्यान्वयन इकाई, वीरगंज उपमहानगरपालीका वाट कान्तिपुर दैनिकमा प्रथम पटक मिती २०७०।०८।२६ मा प्रकाशित भएको वीरगंज उपमहानगरपालीकाको फोहोरमैला व्यवस्थापन कार्ययोजना अन्तर्गत धारा जिल्लाको इतियाही र विश्रामपुर गा.वि.स. मा अवस्थित ११.१३ हेक्टर क्षेत्रमा सानीटरी ल्याण्डफिल्ड साईट निर्माण तथा संचालन गर्ने आयोजनाको वातावरणीय प्रभाव मूल्याङ्कन (EIA) प्रतिवेदन उपर सार्वजनीक सुनवाई कार्यक्रम सम्बन्धि सार्वजनिक सूचनाको प्रतिलिपी तल उल्लेखित कार्यालय/सार्वजनिक स्थलमा उल्लेखित मितीका दिन हामीहरुको रोहवरमा टांसगरी यो मुचुल्कामा सिहछाप गरिदियौं ।

कार्यालय भएमा

क्र. सं.	कार्यालयको नाम	प्रमाणित गर्ने कर्मचारीको नाम	प्रमाणित गरेको मिती	प्रमाणि गर्ने कर्मचारीको सहि	कार्यालयको छाप
१	STUEI Project	प्रमोद कुमार सिंह	०८०१।३०		
२	जिल्ला कृषिविकास कार्यालय, धारा	हीरालाल महर्जन	०८०१०८।३०		
३	[illegible]	अधिकृत इन्जिनियर	०८०१।१३०		
४	जिल्ला प्रशासन कार्यालय धारा				०८०१।१३०

सार्वजनीक स्थल भएमा

स्थलको नाम	उपस्थित व्यक्तिहरु	लिङ्ग	उमेर	ठेगाना	सहिछाप
	१.				
	२.				
	३.				
	४.				
	५.				
	६.				

नेपाल सरकार
वातावरण मन्त्रालय
वातावरण प्रविधि तथा वातावरण महाशाखा
सिंहदरबार, काठमाण्डौं

मुचुल्का

वातावरणीय प्रभाव मुल्याङ्कन (EIA) प्रतिवेदन उपर
सार्वजनीक सुनवाई कार्यक्रम सम्बन्धि
मक्वौला शहर एकिकृत शहरी वातावरण सुधार आयोजना

एशियाली विकास बैंकको सहयोगमा नेपाल सरकार, शहरी विकास मन्त्रालय, मक्वौला शहर एकिकृत शहरी वातावरण सुधार आयोजना, आयोजना कार्यान्वयन इकाई, वीरगज उपमहानगरपालिका वाट कान्तिपुर दैनिकमा प्रथम पटक मिती २०७०।०८।२६ मा प्रकाशित भएको वीरगज उपमहानगरपालिकाको फोहोरमैला व्यवस्थापन कार्ययोजना अन्तर्गत वारा जिल्लाको इतियाही र विश्रामपुर गा.वि.स. मा अवस्थित ११.१३ हेक्टर क्षेत्रमा सानीटरी ल्याण्डफिल्ड साईट निर्माण तथा संचालन गर्ने आयोजनाको वातावरणीय प्रभाव मूल्याङ्कन (EIA) प्रतिवेदन उपर सार्वजनीक सुनवाई कार्यक्रम सम्बन्धि सार्वजनिक सूचनाको प्रतिलिपी तल उल्लेखित कार्यालय/सार्वजनिक स्थलमा उल्लेखित मितीका दिन हामीहरुको रोहबरमा टांसगरी यो मुचुल्कामा सिहछाप गरिदियौं ।

कार्यालय भएमा

क्र. सं.	कार्यालयको नाम	प्रमाणित गर्ने कर्मचारीको नाम	प्रमाणित गरेको मिती	प्रमाणि गर्ने कर्मचारीको सहि	कार्यालयको छाप
१	जिल्ला वन कार्यालय	राम [illegible]	०६।०८।२८	[illegible]	
२	[illegible]	[illegible]	८।२८	[illegible] ८।२८	
३					
४	वीरगञ्ज महानगरपालिका कार्यालय	[illegible]	२०६।८।२८	[illegible] ८।२८	

सार्वजनीक स्थल भएमा

स्थलको नाम	उपस्थित व्यक्तिहरु	लिङ्ग	उमेर	ठेगाना	सहिछाप
	१.				
	२.				
	३.				
	४.				
	५.				
	६.				

नेपाल सरकार
विकास प्रविधि तथा वातावरण महाशाखा
सिंहदरबार, काठमाण्डौं

मुचुल्का

वातावरणीय प्रभाव मुल्याङ्कन (EIA) प्रतिवेदन उपर
सार्वजनीक सुनवाई कार्यक्रम सम्बन्धि
मध्यौला शहर एकिकृत शहरी वातावरण सुधार आयोजना

एशियाली विकास बैंकको सहयोगमा नेपाल सरकार, शहरी विकास मन्त्रालय, मध्यौला शहर एकिकृत शहरी वातावरण सुधार आयोजना, आयोजना कार्यान्वयन इकाई, वीरगंज उपमहानगरपालीका बाट कान्तिपुर दैनिकमा प्रथम पटक मिती २०७०।०८।२६ मा प्रकाशित भएको वीरगंज उपमहानगरपालीकाको फोहोरमैला व्यवस्थापन कार्ययोजना अन्तर्गत वारा जिल्लाको डुतियाही र विश्रामपुर गा.वि.स. मा अवस्थित ११.१३ हेक्टर क्षेत्रमा सानीदरी ल्याण्डफिल्ड साईट निर्माण तथा संचालन गर्ने आयोजनाको वातावरणीय प्रभाव मूल्याङ्कन (EIA) प्रतिवेदन उपर सार्वजनीक सुनवाई कार्यक्रम सम्बन्धि सार्वजनिक सूचनाको प्रतिलिपी तल उल्लेखित कार्यालय/सार्वजनिक स्थलमा उल्लेखित मितीका दिन हामीहरुको रोहवरमा टांसगरी यो मुचुल्कामा सिहछाप गरिदियौं ।

कार्यालय भएमा

क्र. सं.	कार्यालयको नाम	प्रमाणित गर्ने कर्मचारीको नाम	प्रमाणित गरेको मिती	प्रमाणि गर्ने कर्मचारीको सहि	कार्यालयको छाप
१	श्री सशस्त्र प्रहरी बल वि.ओ.पी. बरैनिया, वारा।	डम्बर बहादुर राई	२०७०।०९।०१		
२	श्री [illegible]	[illegible]	२०७०।९।१		
३	विश्रामपुर उप स्वास्थ्य चौकी	मुकेश कु. यादव	२०७०।९।१		
४	श्री नेपाल निजामति कर्मचारी विद्युत्सहकारी	[illegible]	२०७०।९।१		

सार्वजनीक स्थल भएमा

स्थलको नाम	उपस्थित व्यक्तिहरु	लिङ्ग	उमेर	ठेगाना	सहिछाप
	१.				
	२.				
	३.				
	४.				
	५.				
	६.				

नेपाल सरकार, विकास प्रतिनिधि तथा वातावरण मन्त्रालय, सिंहदरबार, काठमाडौं

मुचुल्का

वातावरणीय प्रभाव मुल्याङ्कन (EIA) प्रतिवेदन उपर
सार्वजनीक सुनवाई कार्यक्रम सम्बन्धि
मभौला शहर एकिकृत शहरी वातावरण सुधार आयोजना

एशियाली विकास बैंकको सहयोगमा नेपाल सरकार, शहरी विकास मन्त्रालय, मभौला शहर एकिकृत शहरी वातावरण सुधार आयोजना, आयोजना कार्यान्वयन इकाई, वीरगंज उपमहानगरपालीका बाट कान्तिपुर दैनिकमा प्रथम पटक मिती २०७०।०८।२६ मा प्रकाशित भएको वीरगंज उपमहानगरपालीकाको फोहोरमैला व्यवस्थापन कार्ययोजना अन्तर्गत बारा जिल्लाको इनियाही र विश्रामपुर गा.वि.स. मा अवस्थित ११.१३ हेक्टर क्षेत्रमा सानीटरी ल्याण्डफिल्ड साईट निर्माण तथा संचालन गर्ने आयोजनाको वातावरणीय प्रभाव मुल्याङ्कन (EIA) प्रतिवेदन उपर सार्वजनीक सुनवाई कार्यक्रम सम्बन्धि सार्वजनिक सूचनाको प्रतिलिपी तल उल्लेखित कार्यालय/सार्वजनिक स्थलमा उल्लेखित मितीका दिन हामीहरुको रोहबरमा टांसगरी यो मुचुल्कामा सिहछाप गरिदियौ ।

कार्यालय भएमा

क्र. सं.	कार्यालयको नाम	प्रमाणित गर्ने कर्मचारीको नाम	प्रमाणित गरेको मिती	प्रमाणि गर्ने कर्मचारीको सहि	कार्यालयको छाप
१	श्री ने० रा० मा०वि० इटियाही, बारा	किशोरीलाल प्रसाद	०६०।९।१७	[signature]	[stamp]
२	[illegible]	[illegible]	९।१७	[signature]	
३	[illegible]	[illegible]	"	[signature]	
४					

सार्वजनीक स्थल भएमा

स्थलको नाम	उपस्थित व्यक्तिहरु	लिङ्ग	उमेर	ठेगाना	सहिछाप
	१.				
	२.				
	३.				
	४.				
	५.				
	६.				

नेपाल सरकार
विज्ञान, प्रविधि तथा वातावरण मन्त्रालय
सिंहदरबार, काठमाडौं

ANNEX 5

Participants Attendance Public Hearing Meeting

सार्वजनिक सुनुवाईको कार्यक्रममा उपस्थिती

एशियाली विकास बैंकको सहयोगमा, नेपाल सरकार, शहरी विकास मन्त्रालय, मध्यौला शहर एकिकृत शहरी वातावरण सुधार आयोजना, आयोजना कार्यान्वयन इकाई, वीरगंज उपमहानगरपालिका द्वारा वीरगंज उपमहानगरपालिकाको फोहोरमैला व्यवस्थापन कार्ययोजना अन्तर्गत सानीटरी ल्याण्डफिण्ड साईट निर्माण तथा सचालन गर्न तयार पारेको वातावरणीय प्रभाव मूल्याङ्कन (EIA) प्रतिवेदन उपर मिती २०७० साल पौष ६ गते शनिवार बिहान ११ बजे पर्सा जिल्ला, नगरा-१९ स्थित श्री नेपाल राष्ट्रिय माध्यामिक विद्यालयमा गरिएको सार्वजनिक सुनुवाई कार्यक्रममा उपस्थित सहभागी महानुभावहरुको नामावली ।

क्र.सं.	नाम, थर	उमेर	लिङ्ग	ठेगाना	पेशा	कार्यालय/संस्था/पद	दस्तखत

नेपाल सरकार वातावरण मन्त्रालय विज्ञान, प्रविधि तथा वातावरण मन्त्रालय सिंहदरबार, काठमाण्डौं

सार्वजनिक सुनुवाईको कार्यक्रममा उपस्थिती

एशियाली विकास बैंकको सहयोगमा, नेपाल सरकार, शहरी विकास मन्त्रालय, मझौला शहर एकिकृत शहरी वातावरण सुधार आयोजना, आयोजना कार्यान्वयन इकाई, वीरगंज उपमहानगरपालिका द्वारा वीरगंज उपमहानगरपालिकाको फोहोरमैला व्यवस्थापन कार्ययोजना अन्तर्गत सानीटरी ल्याण्डफिल्ड साईट निर्माण तथा संचालन गर्न तयार पारेको वातावरणीय प्रभाव मूल्याङ्कन (EIA) प्रतिवेदन उपर मिती २०७०. साल पौष ६ गते शनिवार विहान ११ बजे पर्सा जिल्ला, नगवा-१९ स्थित श्री नेपाल राष्ट्रिय माध्यामिक विद्यालयमा गरिएको सार्वजनिक सुनुवाई कार्यक्रममा उपस्थित सहभागी महानुभावहरुको नामावली ।

क्र.सं.	नाम, थर	उमेर	लिङ्ग	ठेगाना	पेशा	कार्यालय/संस्था/पद	दस्तखत
१	प्रभुनाथ साह	३१	पुरुष	नगवा			
२	बिरेन्द्र	२५	पुरुष				[illegible]
३	Anish kumaR	२०	पुरुष	नगवा			Anish
४	देवेन्द्र प्रसाद	२२	पुरुष	नगवा			देवेन्द्र
५	सोमप्रसाद						सोमप्रसाद
६	ओमप्रकाश	२०	पुरुष	नगवा			[illegible]
७	प्रभु प्रसाद चौरसिया	३१	पुरुष	नगवा	व्यापार		[illegible]
८	[illegible]	२३					[illegible]
९	विश्वनाथ प्रसाद चौरसिया	४८	पु.	नगवा	लोकसेवा		[illegible]
१०	सतीश कुमार श्रीवास्तव	४२	पु.	विकास समिति को १५।१९ नगवा	नोकरी	[illegible]	[illegible]
११	[illegible]						[illegible]
१२	जोगिन्द्र महतो	६०	पु०	नगवा	खेती किसान		
१३	[illegible]			नगवा			[illegible]
१४	[illegible] राउत	६२	पु	नगवा	खेती किसान		[illegible]
१५	जोगी राउत	६५	पु०	नगवा	खेती किसान		
१६	चन्द्रिका प्रसाद	६२	पु०	नगवा	खेती किसानी		[illegible]
१७	उमाशंकर यादव	३०	पु०	नगवा	लेबर		[illegible]
१८	असर्फी प्रसाद	४९		इटियाही	खेती		असर्फी
१९	[illegible]	३२		इटियाही	खेती		[illegible]
२०	शम्भु [illegible]	४०		नगवा	कृषि		[illegible]

नेपाल सरकार
विज्ञान, प्रविधि तथा वातावरण मन्त्रालय
सिंहदरबार, काठमाडौं

सार्वजनिक सुनुवाईको कार्यक्रममा उपस्थिती

एशियाली विकास बैंकको सहयोगमा, नेपाल सरकार, शहरी विकास मन्त्रालय, मभौवा शहर एकिकृत शहरी वातावरण सुधार आयोजना, आयोजना कार्यान्वयन इकाई, वीरगंज उपमहानगरपालिका द्वारा वीरगंज उपमहानगरपालिकाको फोहोरमैला व्यवस्थापन कार्ययोजना अन्तर्गत सानीटरी ल्याण्डफिण्ड साईट निर्माण तथा संचालन गर्न तयार पारेको वातावरणीय प्रभाव मूल्याङ्कन (EIA) प्रतिवेदन उपर मिती २०७० साल पौष ६ गते शनिवार बिहान ११ बजे पर्सा जिल्ला, नगवा-१९ स्थित श्री नेपाल राष्ट्रिय माध्यामिक विद्यालयमा गरिएको सार्वजनिक सुनुवाई कार्यक्रममा उपस्थित सहभागी महानुभावहरुको नामावली ।

क्र.स.	नाम, थर	उमेर	लिङ्ग	ठेगाना	पेशा	कार्यालय/संस्था/पद	दस्तखत
२१	[illegible]	४४	पु०	नगवा	खेती किसानी		
२२	[illegible]	५९	पु.	नगवा	पढाई		
२३	हरिकिशोर चौधरी	३०	पु.	नगवा	पढाई		
२४	जितेन्द्र कुमार	७३	पु.	नगवा	पढाई		
२५	राजेन्द्र कुमार चौरसीया	१८	पु.	नगवा	पढाई		
२६	लालबाबु चौरसिया	४२	पु.	नगवा	नोकरी		
२७	अच्छा लाल चौ.	३२	पु	नगवा	नोकरी		
२८	महेन्द्र कुमार	४५	पु०	नगवा	लेखापढि		
२९	रामनाथ फोरसीया	४३	पुरुष	नगवा			
३०	[illegible]	३८	पुरुष	[illegible]	नोकरी		
३१	नागेश्वर प्रसाद	३०	पु०	नगवा	खेती किसानी		
३२	[illegible]	६६	पु०	नगवा			
३३	[illegible]	५५	पु०	[illegible]	[illegible]		
३४	[illegible]	६६	पु०	[illegible]	[illegible]		
३५	[illegible]	४२	पु०	नगवा	किसानी		
३१	[illegible]	३०	पु०	[illegible]	[illegible]		
३६	[illegible]	३०	"	"	"	"	
३८	[illegible]	२६	M	[illegible]	[illegible]	[illegible]	
३९	[illegible]	६३	पु०	नगवा	खेती किसानी		

सार्वजनिक सुनुवाईको कार्यक्रममा उपस्थिती

एशियाली विकास बैंकको सहयोगमा, नेपाल सरकार, शहरी विकास मन्त्रालय, मध्यौला शहर एकिकृत शहरी वातावरण सुधार आयोजना, आयोजना कार्यान्वयन इकाइ, वीरगंज उपमहानगरपालिका द्वारा वीरगंज उपमहानगरपालिकाको फोहोरमैला व्यवस्थापन कार्ययोजना अन्तर्गत सानीटरी ल्याण्डफिलड साइट निर्माण तथा संचालन गर्न तयार पारेको वातावरणीय प्रभाव मूल्याङ्कन (EIA) प्रतिवेदन उपर मिती २०७० साल पौष ६ गते शनिवार विहान ११ बजे पर्सा जिल्ला, नगवा-१९ स्थित श्री नेपाल राष्ट्रिय माध्यमिक विद्यालयमा गरिएको सार्वजनिक सुनुवाई कार्यक्रममा उपस्थित सहभागी महानुभावहरुको नामावली ।

क्र.सं.	नाम, थर	उमेर	लिङ्ग	ठेगाना	पेशा	कार्यालय/संस्था/पद	हस्तखत
४०	~~[illegible]~~ रामचन्द्र प्र० यादव	६२	पु०	नगवा	खेती/किसान		
४१	महेन्द्र महतो कोइरी	६२	पु०	नगवा	किसान		[signature]
४२	शम्भु प्रसाद चौ-	४४	पु०	नगवा	व्यापार		[signature]
४३	[illegible]	४५	पु०	नगवा १९	[illegible]		[signature]
४४	राजीव गिरी	४२	पु	PIU	सा विश		[signature]
४५	उत्तम बज्राचार्य	५५	पु.	वीरगञ्ज	Soc. Dev. Expert DSC		[signature]
४६	प्रकाश अमात्य	५३	पु०	वीरगंज	नोकरी	वीउमनपा/योपु०	[signature]
४७	[illegible]	५६	पु.	वीरगंज	नोकरी	" [illegible]	[signature]
४८	महमद						
४९	[illegible]	५२	पु०	[illegible]	शिक्षक	[illegible]	[signature]
५०	सुवास मिश्र		पु०	वडा नं १८	नोकरी	[illegible]	[signature]
५१	राम ~~[illegible]~~ प्रसाद पाँडे	६४	पु०	नगवा	खेती/किसान		
५२	हरि प्र० चौरसिया	३५	पु०	नगवा नं.१९			[signature]
५३	सरद रत्न श्रेष्ठ	४८	पु	DSC	Environmentalist	DSC - Consultant	[signature]
५४	प्रमिला [illegible]	४६	पु.	DSC	Engineer	Consult	[signature]
५५	[illegible]	३५	पु.	"	[illegible]	"	[signature]
५६	मनोज पाँडे	३५	पु०	"	"	"	[signature]
५७	रामानन्द महतो	४६	पु०	[illegible] - 2	[illegible]	[illegible]	[signature]
५८	रमेश कुमार [illegible]		पु	[illegible]	"	[illegible]	[signature]

नेपाल सरकार
विज्ञान, प्रविधि तथा वातावरण मन्त्रालय
सिंहदरबार, काठमाडौं

ANNEX 6

Summary of Public Consultation Deliberation

Photographs of the Public Hearing Program

नेपाल सरकार
विज्ञान, प्रविधि तथा वातावरण मन्त्रालय
सिंहदरबार, काठमाडौं

PUBLIC HEARING DELIBERATION

PROGRAM

Project: Secondary Towns Integrated Urban Environment Improvement Project

Date: Paush 06, 2070, Saturday (December 21, 2013)

Venue: Shree Nepal Rastriya Madhyamik Vidhyalaya, Nagawa-19, Birgunj, Parsa

Time: 11.00 am

Chairman of the Session: Mr. Mohammad Sarif, Senior Citizen of Nagwa 19, Birgunj Sub-Metropolitan City, Parsa

Chief Guest: Mr. Bijaya Dongol, Acting Executive Officer, Birgunj Sub-Metropolitan City (BSMC) Office.

Guests:

1. Mr. Prakash Man Amatya, Chief Planning Officer, BSMC Office
2. Mr. Devaki Prasad Chaurasiya, Engineer, BSMC Office
3. Mr. Rajiv Giri, Social Development Officer, PIU, STIUEIP
4. Mr. Satish Kumar Shrivastav, Secretary, Nagwa Ward No. 19, Birgunj, Parsa
5. Mr. Ramananda Mahato, Secretary, Bishrampur VDC, Bara
6. Mr. Ramesh Kumar, Secretary, Itiyahi VDC, Bara

Welcome Speech and Introduction about the Project: Mr. Nagendra Jha, Team Leader, DSC, STIUEIP, Birgunj

Detail Briefing about EIA of Sanitary Landfill Site: Mr. Sarad Raj Shrestha, Environmental Specialist, DSC, STIUEIP, Birgunj

Discussion: The floor was open for comments and suggestions from the participants.

Master of Ceremony: Mr. Hem Raj Subedi, Socio-economist, DSC, STIUEIP, Birgunj

Raporter: Mr. Kameshwor Prasad Singh, Engineer, DSC, STIUEIP, Birgunj

PROCEEDINGS OF PUBLIC HEARING

The public hearing program conducted on Paush 06, 2070 (December 21, 2013) at Shree Nepal Rastriya Madhyamik Vidhyalaya, Nagwa Ward No. 19 of Birgunj Sub-Metropolitan City was chaired by Mr. Mohammad Sarif, Sr. Citizen of Nagwa Ward No. 19 of Birgunj Sub-Metropolitan City. The chief guest was Mr. Bijaya Dongol, acting Executive Officer, Birgunj Sub-Metropolitan City Office. The program was also attended by representative from the BSMC, PIU-STIUEIP, Secretary of Ward 19-BSMC, Secretaries of Bishrampur and Itiyahi VDC and local people.

On behalf of the poroponent, Mr. Nagendra Jha, the Team Leader, DSC, STIUEIP welcomed all the guest and participants attending the public hearing program. He briefed about the project, its status and further activities that are due in the process. He emphasized that the project's detail design is almost complete and the procurement

process is underway. He assured that the construction of the project will commence within next four months.

Mr. Sarad Raj Shrestha, the Environmental Specialist from the DSC, STIUEIP stated the purpose of the public hearing program. He made presentations on the EIA report prepared for the proposed Sanitary Landfill Site development. He briefed about the environmental settings, potential adverse environmental impacts due to project implementation and proposed mitigation measures in-built in the design for its minimization. He outlined projects provision on various enhancement measures targeted for the betterment of local community. He conveyed conclusion and recommendation drawn from EIA findings.

Views Expressed by the Speakers

Summary of Public Hearing deliberations and views expressed by the speakers are given below.

Mr. Bijaya Dongol, Acting Executive Officer, Birgunj Sub-Metropolitan City Office (BSMC)

- He expressed his pleasure on exchange of opinion with the local people and thanked them for their support and cooperation rendered during acquisition of land that was mostly owned by people residing in Nagwa Ward No. 19 of BSMC.
- He emphasized that the project is loan finance from Asian Development Bank and highlighted project settings on Private Public Partnership approach.
- He clarified on issues raised by the locals and said the project provisions all the remedial measures for minimization of adverse environmental impact due to implementation of the project and urged all to keep positive thinking on project implementation. He said that the project rather will improve the environment of Birgunj.

Mr. Prakash Man Amatya, Chief Planning Officer, BSMC Office

- Mr. Amatya made aware regarding another project component that will improve drainage, sewerage and roads of Birgunj Municipality that will ultimately resolve the flooding problem that Birgunj is presently facing.
- The STIUEIP project in Birgunj consists of two components. First will take care of drainage, sewerage and roads improvement while second focuses on improvement of solid waste management of Birgunj Sub-metropolitan City by developing Sanitary Landfill Site at Itiyahi 7 and Bishrampur 9 of Bara District. The drainage component provisions more investment in Nagwa Ward No. 19. The present haphazard dumping of solid waste in Birgunj will now be managed properly by placing solid waste in a sanitary manner at proposed landfill site having various infrastructures including composting plant.
- The social development program of the project consists of various training program to be given to affected locals in a priority basis. The phase wise training program will now focus on affected locals of Itiyahi/Bishrampur VDC of Bara District and Nagwa Ward No. 19 of Birgunj Sub-metropolitan City.

Mr. Deveki Prasad Chaurasiya, Engineer, BSMC Office

The project will be implemented as per the detail design which will minimize adverse environmental impacts.

Mr. Rajiv Giri, Social Development Officer, PIU, STIUEIP

- The training program to be rendered by the Project basically focuses on tailoring, badic computer, driving, beautiparlor, and mobile reparing etc.
- He urged the affected locals to form cluster of committees and submit selected training program sought to the project through respective ward office. These will ease the project in selecting training candidate for suitable training program.

Mr. Satish Kumar Shrivastav, Secretary, Nagwa Ward No. 19, Birgunj, Parsa

He urged that the ward office will coordinate with the project on training programs sought by different committees from the affected locals. Similar Notation was delivered by Mr. Ramananda Mahato, Secretary, Bishrampur VDC and Mr. Ramesh Kumar, Secretary, Itiyahi VDC of Bara District.

After the expression of views and concerns by the representatives, people were allowed to express their feeling and views on the project. Similarly, various issues were raised by total 11 participants. The copy of written comments is presented at the end of the proceeding. On behalf of the proponent, Team Leader Mr. Nagendra Jha and Environmental Specialist Mr. Sarad Raj Shrestha answered the querries raised by the participants. It was assured that the project is committed to safeguard the environment and will implement all the mitigation and enhancement measures outlined in the EIA report within the rules and regulation of the Government of Nepal.

The proponent elaborated that the environmental impact assessment process is conducted in accordance with Environmental Protection Rules. The purpose of EIA study is classifying the impacts which can be avoided or mitigated or compensated. The study will incorporate all the relevant issues raised during the public hearing meeting. The proponent will submit the EIA Report to MoSTE through Ministry of Urban Development by incorporating the suggestions of this meeting. MoSTE will make EIA report public by publishing 30 days public notice in one of the national daily newspaper. The notice will specify the locations where the EIA report will be available. People will have another opportunity to review the report and makie sure that their concerns and suggestions are incorporated. People can directly send the suggestions to MoSTE if they have not been incorporated in Final EIA Report.

Issues Raised by the Participants

The issues raised and answers given during the public hearing meeting are summarized as follows.

Mr. Shom P. Chaurasiya

Issues:

- The temple nearest to the project site should be rectified.

- The project should construct Cemetary.
- New bridge whoud be built on Singaha River.

Answers:

- The cost for rectification of temples, construction of well managed cemetery and a bridge in Singaha river is already included in the project design estimate.

Mr. Lalu P. Chaurasiya

Issues:

- The locals of Nagwa should be involed in development works.
- Land for Cemetary should be identified and constructed accordingly.

Answers:

- The project will give priority to affected locals on employment opportunities as per their skill and capacity.
- During construction, the Municipality will identify appropriate location for construction of well managed cemetery in consultation with the locals. The project has already allocated budged for the same.

Mr. Ram Binod Singh

Issues:

- The project should develop our surrounding villages by constructing roads.

Answers:

- The project in it's design and estimate includes development of roads, bridge and drainage structures including various training programs for the affected locals.

Mr. Krishna P. Kashuwaha

Issues:

- The mechanism for minimization of odor problem should be clarified.
- The project should make arrangement for few locals to observe ongoing similar project to ensure that the project will not incure any adverse impacts.
- The project NGO has been rendering training program without maintaining co-ordination with the local club. This should not happen in future.

Answers:

- For minimization of odor, the solid waste will be transported at the earliest from the collection point in closed vehicles. The waste will be immediately sorted for composting and recycling while the residual waste will be laid, spread in layers, daily covered by clay soil and compacted. Further, a buffer zone all around the landfill site will be developed with plantation of suitable trees for the attenuation of air pollution and smell.
- During construction period, the project will organize visit program for few selected locals to similar project to make them aware that the sanitary landfilling system will not adversely affect the local environment.

- The NGO will coordinate with the respective ward office while rendering traning programs.

Mr. Medhish P. Yadav

Issues:

- The project should give priority to the children of affected locals for employment as per their skill and capacity.

Answers:

- It is already mentioned that the project provisions in providing employment opportunity to the extent possible to the affected locals as per their skill and capacity.

Mr. Arjun P. Yadav

Issues:

- Alerted that the project works will be stopped if the assurance given at present is not fulfilled.
- Assurance for employment should be fulfilled.

Answers:

- The project will stick towards its committment.

Mr. Harindra Yadav

Issues:

- The assurance made by Municipality during acquisition of land should be fulfilled.
- We are suspicious on quality operation of the landfill by the Municipality.
- Environmental pollution should be minimized.
- We are assured that the project will rectify nearby temple.
- Assurance only is given for construction of health post but it has not been initiated.
- Employment opportunity to the affected locals should be assured.
- Construction of bridge should be carried out together with project implementation.

Answers:

- All the above assurances are provisioned in the project which is sure to be implemented.
- Various mitigation measures are inclusive in the design for minimization of environmental pollution.
- A health clinic will be established upon commencement of project work within the site for use by project personnel as well as local residents.
- The bridge over Singaha River will be constructed.
- The landfill will be operated as per its operational plan.

Rest of the issues raised by other four participants is similar to the issues already voiced above.

DOCUMENTATION OF PAPERS OF PUBLIC HEARING

The EIA report could be legally finalized only after incorporation of issues during public hearing on Draft EIA Report. Almost all the issues raised by locals are already addressed in this EIA report. Hence, in order to comply with the legal requirements, the documentation of procedures indicated in the EPR 1997 seems important. The EIA report is such a compilation and contains the following.

- Public Notice and Muchulkas.
- Public Hearing Deliberation and Collection of Written Notes (Issues/Suggestions) from the participants.
- Executive Summary of Draft EIA Report (Nepali Version).
- Recommendations from the affected VDCs and Municipality.
- List of Participants.
- Photographs.

(9)

सार्वजनिक सुनुवाईको कार्यक्रममा उठाइएका सवालहरु

एशियाली विकास बैंकको सहयोगमा, नेपाल सरकार, शहरी विकास मन्त्रालय, मध्यौला शहर एकिकृत शहरी वातावरण सुधार आयोजना, आयोजना कार्यान्वयन इकाई, बीरगंज उपमहानगरपालिका द्वारा बीरगंज उपमहानगरपालिकाको फोहोरमैला व्यवस्थापन कार्ययोजना अर्न्तगत सानीटरी ल्याण्डफिण्ड साईट निर्माण तथा संचालन गर्न तयार पारेको वातावरणीय प्रभाव मूल्याङ्कन (EIA) प्रतिवेदन उपर मिती २०७० साल पौष ६ गते शनिवार विहान ११ बजे पर्सा जिल्ला, नगवा-१९ स्थित श्री नेपाल राष्ट्रिय माध्यामिक विद्यालयमा गरिएको सार्वजनिक सुनुवाई कार्यक्रममा उपस्थित हुनुभई छलफलमा सहभागी महानुभावहरुबाट उठाईएका सवालहरु ।

क्र.सं.	नाम, थर	ठेगाना	उठाईएका सवालहरु
१.	विजय उंगोल नि.का.अ.	नगरपालिका प्रतिनिधी मुख्य आयोती	• Land field site योजनाबाट हुने सकारात्मक प्रभाव बारे व्याख्या गर्नु भयो।
*	स्थानिय बासिन्दा संग विचार आदान प्रदान सम्बन्धमा खुशी व्यक्त गर्दै स्थानियबासीले	• जनताबाट उठेका योजना सम्बन्धी जिज्ञासाहरुलाई प्रष्ट पार्दै, योजनाबाट
	ले जग्गा दिई सहयोग गर्नु भएमा धन्यवाद दिनु भयो ।	पर्न सक्ने सकारात्मक प्रभावलाई न्यूनीकरण गर्दै, योजना निर्माण सम्बन्धी
	भएको र Private Public Patnership बारे प्रष्ट पार्नु भयो।	सकात्मक सोच राख्न पर्दछ। भन्ने प्रकाश पार्नु भयो। *
२.	प्रकाश मान श्रेष्ठ सुपरव्. यो.अ.	बीरगंज उप नगरपालिका	बिरगंज उप-नगरपालिकाको विकासको पूर्वाधार संरचना निर्माणको क्रममा यो पूर्वाधार संरचनाले Naturally बग्ने बर्षातको पानीलाई बाधा पुर्याउने दिशामा, यस बाध मित्रको पानीलाई यस योजनाले
			अन्तरगत निर्माण हुने ढलले निकास दिने छ।

(2)

सार्वजनिक सुनुवाईको कार्यक्रममा उठाइएका सवालहरु

एशियाली विकास बैंकको सहयोगमा, नेपाल सरकार, शहरी विकास मन्त्रालय, मभौला शहर एकिकृत शहरी वातावरण सुधार आयोजना, आयोजना कार्यान्वयन इकाई, बीरगंज उपमहानगरपालिका द्वारा बीरगंज उपमहानगरपालिकाको फोहोरमैला व्यवस्थापन कार्ययोजना अन्तर्गत सानीटरी ल्याण्डफिण्ड साईट निर्माण तथा संचालन गर्न तयार पारेको वातावरणीय प्रभाव मूल्याङ्कन (EIA) प्रतिवेदन उपर मिती २०७० साल पौष ६ गते शनिबार विहान ११ वजे पर्सा जिल्ला, नगवा-१९ स्थित श्री नेपाल राष्ट्रिय माध्यामिक विद्यालयमा गरिएको सार्वजनिक सुनुवाई कार्यक्रममा उपस्थित हुनुभई छलफलमा सहभागी महानुभावहरुबाट उठाईएका सवालहरु ।

क्र.सं.	नाम, थर	ठेगाना	उठाईएका सवालहरु
			• यो योजना निर्माण कार्य दुई Phase मा हुने छ। • खुल्ला बग्ने खोलाहरुलाई
			छोपेर चाहिएको Site मा निर्माण गरिने छ।
			• यस योजनाले वडा नं-१५ मा बढी लगानी गरिएको देखियोको छ।
			• अहिले सम्म यत्र तत्र फोहर हरु फालिएकोलाई अबको योजनामा व्यवस्थीत तरिकाले
			एक ठाउँमा व्यवस्थीत गर्नेछ। • Social Development को कुरामा गरिब व्यक्तिहरुलाई बढी प्राथ-
			मिकता दिइने छ। विशेष गरी Training दिइने छ। • Basic Training अब
			योजनामा जग्गा पर्ने प्रभावित व्यक्तिलाई Second Phase मा दि गरिने छ।

(३)

सार्वजनिक सुनुवाईको कार्यक्रममा उठाइएका सवालहरु

एशियाली विकास बैंकको सहयोगमा, नेपाल सरकार, शहरी विकास मन्त्रालय, भक्तौला शहर एकिकृत शहरी वातावरण सुधार आयोजना, आयोजना कार्यान्वयन इकाई, बीरगंज उपमहानगरपालिका द्वारा बीरगंज उपमहानगरपालिकाको फोहोरमैला व्यवस्थापन कार्ययोजना अर्न्तगत सानीटरी ल्याण्डफिण्ड साईट निर्माण तथा संचालन गर्न तयार पारेको वातावरणीय प्रभाव मूल्याङ्कन (EIA) प्रतिवेदन उपर मिती २०७० साल पौष ६ गते शनिबार बिहान ११ बजे पर्सा जिल्ला, नगवा-१९ स्थित श्री नेपाल राष्ट्रिय माध्यामिक विद्यालयमा गरिएको सार्वजनिक सुनुवाई कार्यक्रममा उपस्थित हुनुभई छलफलमा सहभागी महानुभावहरुबाट उठाईएका सवालहरु ।

क्र.सं.	नाम, थर	ठेगाना	उठाईएका सवालहरु
३.	देवको प्र. चौरसिया इन्जिनियर	वीरगंज नगर पालिका ई.	• यो योजना Design अनुसार कार्यान्वयन हुनेछ रगरिनेछ। र जसबाट नकारात्मक प्रभाव -
			लाई नियन्त्रणीकरण गरिने छ।
४.	राजीव गिरी सामाजिक विकास अधिकृत	योजना कार्यान्वयन इकाई प्रतिनिधी	•) विविध Training सम्बन्धी (कम्प्यूटर, Mobile, सिलाई - बुनाई) आदि)
			•) Training लिन चाहने योजनमा जग्गा पर्ने प्रभावित व्यक्तिहरुको समूह बनाई
			सम्बन्धित वडा कार्यालय मार्फत योजना कार्यालयमा पेश गर्ने भन्ने तारेख।
५.	मोतमद खरीफ सभाका सभासद	नगवा, वडा नं. १९,	प्रष्टयाइयो । •) वहाँको समापनमा।
६.	सतिस कु. श्रीवास्तव	नगवा वडा नं १९ को सचिव	सबै सम्पन्न भएको हो। •) Training लिन चाहने व्यक्तिहरुको समूह लाई योजना संग सम्बन्ध गर्ने बारे बताइयो ।

(४)

सार्वजनिक सुनुवाईको कार्यक्रममा उठाइएका सवालहरु

एशियाली विकास बैंकको सहयोगमा, नेपाल सरकार, शहरी विकास मन्त्रालय, मभौला शहर एकिकृत शहरी वातावरण सुधार आयोजना, आयोजना कार्यान्वयन इकाई, वीरगंज उपमहानगरपालिका द्वारा वीरगंज उपमहानगरपालिकाको फोहोरमैला व्यवस्थापन कार्ययोजना अन्तर्गत सानीटरी ल्याण्डफिण्ड साईट निर्माण तथा संचालन गर्न तयार पारेको वातावरणीय प्रभाव मूल्याङ्कन (EIA) प्रतिवेदन उपर मिती २०७० साल पौष ६ गते शनिबार विहान ११ बजे पर्सा जिल्ला, नगवा-१९ स्थित श्री नेपाल राष्ट्रिय माध्यामिक विद्यालयमा गरिएको सार्वजनिक सुनुवाई कार्यक्रममा उपस्थित हुनुभई छलफलमा सहभागी महानुभावहरुबाट उठाईएका सवालहरु ।

क्र.सं.	नाम, थर	ठेगाना	उठाईएका सवालहरु
६)	सोम फ्र चौरसिया	वडा नं-१९ नगवा	१) मन्दिरको पुन: निर्माण हुनु पर्ने। २) समसान घाट को निर्माण हुनु पर्ने ३) पुल निर्माण हुनु पर्ने
७)	लालु फ्र चौरसिया	नगवा वडा नं. १९	१) नगवा बस्तीलाई विकासको काममा समावेश गरिनु पर्ने। २) समसान घाटलाई हुने जग्गाको व्यवस्था गरी पुन: निर्माण गर्नु पर्ने।
९)	राम बिनोद मिश्र सम्बन्धित स्कुल का	नगवा वडा नं. १९ शिक्षक	१) यस Project बाट हाम्रो गाउँ घरका बाटा - घाटको विकास हुनु पर्ने।
१०)	कृष्ण फ्र कुशवाहा	वडा नं.-१९ नगवा	१) वातावरणमा फैलिने दुरगंध लाई न्यूनीकरण गर्न कुन उपाय अवलम्बन गरिएको पारेमा स्पोहनु भयो। २) Land field Site बाट आउने दुरगंध लाई न्यून गर्न के उपाय उपलब्ध गर्नु भएको छ।

(४)

नेपाल सरकार
वन, वातावरण तथा वातावरण मन्त्रालय
सिंहदरबार, काठमाण्डौं

सार्वजनिक सुनुवाईको कार्यक्रममा उठाइएका सवालहरु

एशियाली विकास बैंकको सहयोगमा, नेपाल सरकार, शहरी विकास मन्त्रालय, मभौला शहर एकिकृत शहरी वातावरण सुधार आयोजना, आयोजना कार्यान्वयन इकाई, बीरगंज उपमहानगरपालिका द्वारा वीरगज उपमहानगरपालिकाको फोहोरमैला व्यवस्थापन कार्ययोजना अर्न्तगत सानीटरी ल्याण्डफिण्ड साईट निर्माण तथा संचालन गर्न तयार पारेको वातावरणीय प्रभाव मूल्याङ्कन (EIA) प्रतिवेदन उपर मिती २०७० साल पौष ६ गते शनिबार विहान ११ बजे पर्सा जिल्ला, नगवा-१९ स्थित श्री नेपाल राष्ट्रिय माध्यामिक विद्यालयमा गरिएको सार्वजनिक सुनुवाई कार्यक्रममा उपस्थित हुनुभई छलफलमा सहभागी महानुभावहरुबाट उठाईएका सवालहरु ।

क्र.सं.	नाम, थर	ठेगाना	उठाईएका सवालहरु
			१) यस Project ले कुनै पानी नकारात्मक प्रभाव पार्दैन भन्ने कुरा स्पष्ट पार्नु पर्ने।
			अन्य हाइमा भएको Project बारे अवलोकन गराइनु पर्ने।
			• योजनामा कार्यरत NGO ले स्थानिय Club हरुसंग समन्वय गरी Training गरेको २ अब - का दिन हरुमा समन्वय गरी तालिम संचालन गरिनु पर्ने।
११)	मेदिनी प्र० यादव	नगवा पा नं- १९	१) यस योजनाबाट प्रभावित व्यक्तिहरुका बाल बच्चालाई योग्यता अनुसारको जागिर
१२)	अर्जुन प्र० यादव	नगवा - १९	खुवाउने । २)आर्थिले पाइरहको आश्वासन यदि भविष्यमा कार्यान्वयन नभएमा कम गरेका गर्ने। ३) जागिर दिने आश्वासन दिइ हुनु पर्ने ।

६९

सार्वजनिक सुनुवाईको कार्यक्रममा उठाइएका सवालहरु

एशियाली विकास बैंकको सहयोगमा, नेपाल सरकार, शहरी विकास मन्त्रालय, मभौला शहर एकिकृत शहरी वातावरण सुधार आयोजना, आयोजना कार्यान्वयन इकाई, वीरगंज उपमहानगरपालिका द्वारा वीरगंज उपमहानगरपालिकाको फोहोरमैला व्यवस्थापन कार्ययोजना अन्तर्गत सानीटरी ल्याण्डफिण्ड साईट निर्माण तथा संचालन गर्न तयार पारेको वातावरणीय प्रभाव मूल्याङ्कन (EIA) प्रतिवेदन उपर मिती २०७० साल पौष ६ गते शनिवार विहान ११ बजे पर्सा जिल्ला, नगवा-१९ स्थित श्री नेपाल राष्ट्रिय माध्यामिक विद्यालयमा गरिएको सार्वजनिक सुनुवाई कार्यक्रममा उपस्थित हुनुभई छलफलमा सहभागी महानुभावहरुबाट उठाईएका सवालहरु ।

क्र.सं.	नाम, थर	ठेगाना	उठाईएका सवालहरु
१३.)	हरिन्द्र यादव	नगवा - १९	) जग्गा क्षेप विस्तनको लेखा. मा नगर पालिका दिइएको आश्वासन पुरा हुनु पर्ने ।
			• योजनाले निर्माण सम्पन्न भई नगर पालिकालाई हस्तान्तरण गरेपछि कार्यान्वयन ~~गर्ने~~ हुनेमा शंका व्यक्त ।
			) वातावरण Pollution सक्दो निम्न गराउनु पर्ने ।
			• नगवा मठ मंदीरको पुन निर्माण हुनेमा विश्वस्त) Health post निर्माण
			नगरपालिका द्वारा आश्वासनमा मात्र सिमित नभएको ए यसलाई कार्यान्वयन हुनु पर्ने ।
			) प्रभावित व्यक्तिलाई दिइने जागिर आश्वासन हुदै कार्यान्वयन हुनु पर्ने ।
			) Bridge निर्माण कार्य सक्दो Project सँग सँगै जानु पर्ने ।

(6)

सार्वजनिक सुनुवाईको कार्यक्रममा उठाइएका सवालहरु

एशियाली विकास बैंकको सहयोगमा, नेपाल सरकार, शहरी विकास मन्त्रालय, मध्यौला शहर एकिकृत शहरी वातावरण सुधार आयोजना, आयोजना कार्यान्वयन इकाई, बीरगंज उपमहानगरपालिका द्वारा बीरगंज उपमहानगरपालिकाको फोहोरमैला व्यवस्थापन कार्ययोजना अन्तर्गत सानीटरी ल्याण्डफिण्ड साईट निर्माण तथा संचालन गर्न तयार पारेको वातावरणीय प्रभाव मूल्याङ्कन (EIA) प्रतिवेदन उपर मिती २०७० साल पौष ६ गते शनिबार विहान ११ बजे पर्सा जिल्ला, नगवा-१९ स्थित श्री नेपाल राष्ट्रिय माध्यामिक विद्यालयमा गरिएको सार्वजनिक सुनुवाई कार्यक्रममा उपस्थित हुनुभई छलफलमा सहभागी महानुभावहरुवाट उठाईएका सवालहरु ।

क्र.सं.	नाम, थर	ठेगाना	उठाईएका सवालहरु
१४)	गौरी शंकर यादव	१९ वडा नं. नगवा	) जग्गा प्रभावित व्यक्तिले जागिर पाइनु पर्ने ।
१५.	विश्व नाथ कु चौरसिया	वडा नं.-१९ नगवा	) प्रभावित व्यक्तिलाई जागिर दिनु पर्ने ।) Health post र नालाको विकास हुनु पर्ने ।) Social Training दिने अहिले सम्म नगरेको र हुनु पर्ने माग ।) आश्वासन पाएका कुरालाई अहिले सम्म शुरु नगरेकोले त्यस प्रति आशवस्त नभएको ।
१६)	अरुण यादव	नगवा वडा नं- १९	Health post निर्माण गर्ने आश्वास पाएकोमा अहिले सम्म कार्यान्वयन नगरेको ।
१७)	अजय पासवान	नगवा वडा नं- १९	Training मा effected भान्देलाई समावेस गरिनु पर्ने ।

सार्वजनिक सुनुवाईको कार्यक्रममा उठाइएका सवालहरु (७)

एशियाली विकास बैंकको सहयोगमा, नेपाल सरकार, शहरी विकास मन्त्रालय, मध्यौला शहर एकिकृत शहरी वातावरण सुधार आयोजना, आयोजना कार्यान्वयन इकाई, बीरगंज उपमहानगरपालिका द्वारा बीरगंज उपमहानगरपालिकाको फोहोरमैला व्यवस्थापन कार्ययोजना अन्तर्गत सानीटरी ल्याण्डफिण्ड साईट निर्माण तथा संचालन गर्न तयार पारेको वातावरणीय प्रभाव मूल्याङ्कन (EIA) प्रतिवेदन उपर मिती २०७० साल पौष ६ गते शनिवार विहान ११ बजे पर्सा जिल्ला, नगवा-१९ स्थित श्री नेपाल राष्ट्रिय माध्यामिक विद्यालयमा गरिएको सार्वजनिक सुनुवाई कार्यक्रममा उपस्थित हुनुभई छलफलमा सहभागी महानुभावहरुबाट उठाईएका सवालहरु ।

क्र.सं.	नाम, थर	ठेगाना	उठाईएका सवालहरु
१७)			•Training दोलाउने कुरो criteriya हरु अवलम्बन गरिनु पर्ने व्यवस्था
			जानकारी दिनु पर्ने ।
			०) यदि नगर पालिकाले दिएको आश्वासन पुरा गर्न नसक्यो भने कम्पनी Tender गरेको ।

ANNEX 7

Recommendation Letters from the Relevant Stakeholders

श्री गाउँ विकास समितिको कार्यालय

बिश्रामपुर (बारा)

Village Development Commitee

Bishrampur (Bara)

पत्र संख्या :- ०६०/०६१

च० नं० :-

मिति २०६०/०९/०५

नेपाल सरकार
विज्ञान, प्रविधि तथा वातावरण मन्त्रालय
सिंहदरबार, काठमाण्डौं

विषय :- सिफारिस पत्र

श्री मुख्य शहर (एकिकृत शहरी) वातावरण सुधार आयोजना
आयोजना कार्यान्वयन इकाई
विरगंज उप-म.न.पा. वीरगंज।

प्रस्तुत विषयमा मिति २०६०/८/२६ गतेको कान्तिपुर दैनिक पत्रिकामा प्रकाशित वातावरणीय प्रभाव मूल्यांकन (EIA) प्रतिवेदन उपर सार्वजनिक सुनवाई कार्यक्रम सम्बन्धी सार्वजनिक सूचना यस कार्यालयमा टाँस गरिएको व्यहोरा अवगत भयो। बारा जिल्लाको बरियारपुर र बिश्रामपुर गा.वि.स.को क्रमश: वडा नं० ६, ८, ९ मा अवस्थित ११.१३ हेक्टर क्षेत्रमा स्यानिटरी ल्याण्डफिल्ड साईट निर्माण तथा संचालन गर्ने प्रस्तावको पूर्ण जानकारी भयो। आयोजनाले वातावरणीय असरहरू पहिचान गरी व्यवहारिक न्यूनीकरणका उपायहरू अवलम्बन गरी उचित अनुगमन गर्ने प्रावधानहरू समेटिएको सन्दर्भ अवगत भयो। साथै विभिन्न वातावरणीय अभिवृद्धिका कार्यक्रमहरू पनि समावेश गरिएको यस आयोजनाहरूमा स्थानीय जन समुदायको जीवनस्तरलाई माथि उकास्न आयोजनाबाट मद्दत पुग्ने विश्वास लिइएको छ।

यी सबै पक्षलाई मध्यनजर गर्दै आयोजना कार्यान्वयन प्रक्रिया चाँडै अगाडि बढोस् भन्ने शुभकामना साथ सिफारिस गर्दछु।

(हस्ताक्षर)
०६०
गा.वि.स.को सचिव

श्री गाउं विकास समितिको कार्यालय

इटियाही, बारा

The Office of Village Development Committee

Itiyahi, Bara

पत्र संख्या :

चलानी नं. १३६।०६०।०६७

मिति: २०६०।०९।०६

विषयः सिफारिस-पत्र।

श्री मझौला शहर एकिकृत शहरी वातावरण आयोजना
आयोजना कार्यान्वयन इकाई
वीरगंज उप-म. न. पालिका वीरगंज।

प्रस्तुत विषयमा मिति २०६०।८।२६ गतेको कान्तिपुर दैनिक पत्रिकामा प्रकाशित वातावरणीय प्रभाव मुल्यांकन (EIA) प्रतिवेदन उपर सार्वजनिक सुनवाई कार्यक्रम सम्बन्धि सार्वजनिक सूचना यस कार्यालयमा टाँस गरिएको व्यहोरा अवगत भयो। बारा जिल्लाको इटियाही र बिश्रामपुर गा.वि.स. को क्रमश: ८,९ मा अवस्थित ११.१३ हेक्टर क्षेत्रमा स्यानिटरी ल्याण्डफिल्ड साईट निर्माण तथा संचालन गर्ने प्रस्तावको पूर्ण जानकारी भयो। आयोजनाले वातावरणीय असर हरु पहिचान गरी व्यवहारिक न्यूनीकरणका उपायहरु अनुगमन गर्ने उचित अनुगमन गर्ने प्रावधानहरु समेटिएको सन्दर्भ अवगत भयो। साथै विभिन्न वातावरणीय अभिवृद्धि कार्यक्रम हरु पनि समावेश गरिएको हुँदा स्थानीय जन समुदायको जीवनस्तरलाई माथी उकास्न आयोजनाबाट मद्दत पुग्ने विश्वास लिएको छ।

यि सबै पक्षलाई मध्यनजर गर्दै आयोजना कार्यान्वयन प्रक्रिया चाँडै अगाडी बढोस भन्ने शुभकामना सहित सिफारिस गर्दछु।

०६०।९।६

श्याम [illegible]

गा० वि० स० को सचिव

वीरगंज उप-महानगरपालिका
BIRGANJ SUB-METROPOLITAN CITY

पत्र संख्या :-
चलानी नं ६१/८६/०६९

मिति: २०६९/१/१६

विज्ञप्ति सिफारीस पत्र

श्री नगरपाला शहर एकीकृत शहरी वातावरण सुधार आयोजना
आयोजना कार्यान्वयन इकाई
वीरगंज उप-महानगरपालिका

प्रस्तुत विषयमा मिती २०६०/८/२६ गतेको कान्तिपुर दैनिक पत्रिकामा प्रकाशित वातावरणीय प्रभाव मुल्याङ्कन (EIA) प्रतिवेदन उपर सार्वजनिक सुनवाई कार्यक्रम सम्बन्धी सार्वजनिक सुचना यस कार्यालयमा यस अघिको अवधिमा प्राप्त भयो । यस जिल्लाको इनरुवी र विजयपुर गा.वि.स.को क्रमशः वडा नं.६ र ९ मा अवस्थित ११.१८ हेक्टर क्षेत्रमा हुने प्रस्तावित व्यावसायिक सहरी विकास तथा संचालन गर्ने प्रस्तावको पुर्व जानकारी भयो । आयोजनाको वातावरणीय असरहरु पहिचान गरी व्यवहारीक न्यूनीकरणका उपायहरु अवलम्बन गरी उचित अनुगमन गर्ने प्रस्तावहरु समेटिएको सन्तुष्ट भएकोले । साथै विभिन्न वातावरणीय अभिवृद्धिका कार्यक्रमहरु पनि समावेश गरीएको हुनाले स्थानिय जनसमुदायको जीवनस्तरमा थप सकारात्मक आयोजनाबाट सहज रुपमा विकास हुने विश्वास लिएको छु ।

यि सबै पक्षलाई गहनतापुर्वक गरिने आयोजना कार्यान्वयन प्रक्रियामा चाहिने अनुगमन तथा सिफारीस गर्दछु ।

वडा सचिव
वडा सचिव कार्यालय

"स्वस्थ सुन्दर विकासको शहर वीरगंज नगर"

पशुपति आदर्शनगर, वीरगंज (नेपाल) फोन : ०५१-५२२०१०, ५२२८०२, ५२०९४४,५२०९९६, ५३०८४५, ५२२८०४, फैक्स : ०५१-५२२०१४
Pashupati Adarsh Nagar, Birgany (Nepal), Ph 0977-51-522010, 522802, 520944, 520966, 530845, 522803 Fax 051-522014, Email: bjsubmc@ntcnet.com.np

वीरगंज उप-महानगरपालिका कार्यालय
BIRGANJ SUB-METROPOLITAN CITY OFFICE

मिति : २०७०।०९।०७

च.नं.२५४१०६०।०६९

श्री मझौला शहर एकिकृत शहरी वातावरण सुधार आयोजना
आयोजना कार्यान्वयन इकाई
वीरगंज उपमहानगरपालिका
वीरगंज ।

विषय : सिफारिस पत्र ।

प्रस्तुत विषयमा मिति २०७०।०८।२६ गतेको कान्तिपुर दैनिक पत्रिकामा प्रकाशित वातावरणीय प्रभाव मुल्याङ्कन (EIA) प्रतिवेदन उपर सार्वजनिक सुनवाई कार्यक्रम सम्बन्धि सार्वजनिक सूचना यस कार्यालयमा टांस गरिएको व्यहोरा अवगत भयो । बारा जिल्लाको इटियाही र विश्रामपुर गा.वि.स.को क्रमशः वडा नं. ७ र ९ मा अवस्थित ११.१३ हेक्टर क्षेत्रमा स्यानीटरी ल्याण्डफिल्ड साइट निर्माण तथा संचालन गर्ने प्रस्तावको पूर्ण जानकारी भयो । आयोजनाले वातावरणीय असरहरु पहिचान गरी व्यहारिक न्यूनिकरण उपायहरु अवलम्बन गरी उचित अनुगमन गर्ने प्रावधानहरु समेटिएको संदर्भ अवगत भयो । साथै विभिन्न वातावरणीय अभिवृद्धिका कार्यक्रमहरु पनि समावेश गरिएको हकमा स्थानीय जनसमुदायको जीवनस्तरलाई माथि उकास्न आयोजनाबाट मदत पुग्ने विश्वास लिएको छु ।

यी सबै पक्षलाइ मध्यनजर गर्दै आयोजना कार्यान्वयन प्रकृया चाँडै अगाडि बढोस भन्ने शुभकामनाका साथ सिफारिस गर्दछु ।

भवदीय
तारा बहादुर कार्की
कार्यकारी अधिकृत
कार्यकारी अधिकृत

स्वच्छ सुन्दर विकासको शहर वीरगंज नगर
पशुपति आदर्शनगर,वीरगंज, नेपाल फोन ०५१-५२०१०,५२८०२, फयाक्स ०५१-५२०१४
Pashupati Adarsh Nagar,Birganj(Nepal),Ph.977-51-22010 22802,Fax 051-22014
E-mail :- brjsuhm@ntcnet.com.np
Filename: letterpad

आज मिति २०६८ साल जेठ महिना २४ गते मंगलवार का दिन जिल्ला प्रशासन कार्यालय बारा कलैया को भवनमा प्रमुख जिल्ला अधिकारी श्री बसन्त कुमार उपाध्याय ज्यु को अध्यक्षतामा जग्गा प्राप्ती ऐन २०३४ बमोजिम मुआब्जा निर्धारण समिति को बैठक बसि देहाय बमोजिमको उपस्थितिमा देहाय बमोजिमको निर्णय गरियो ।

विषय :- जग्गाको मुआब्जा निर्धारण सम्बन्धमा ।

उपस्थिति

- प्रमुख जिल्ला अधिकारी श्री बसन्त कुमार उपाध्याय ज्यू
- नि. स्थानिय विकास अधिकारी श्री
- शाखा अधिकृत मालपोत कार्यालय बारा श्री सुमन प्रसाद चौधरी ज्यू
- नापी कार्यालय बारा
- कार्यकारी अधिकृत श्री शिवदत्त भट्टराई ज्यू
- परियोजना व्यवस्थापक श्री शैलेन्द्र झा ज्यू
- योजना प्रमुख श्री प्रकाश मान सिंह अमात्य ज्यू
- लेखा अधिकृत श्री सुमन झा ज्यू
- लेखापाल (जि.प्र.का.बारा) श्री राजेन्द्र कुमार कार्की ज्यू

(१) निर्णय :- वीरगंज उप-महानगरपालीका को मझौला शहर एकिकृत शहरी वातावरणीय सुधार परियोजना अन्तर्गत संचालन गरिने Land fill site - निर्माण कार्यका लागि बारा जिल्ला विश्रामपुर वडा नं ९ र ईटियाही वडा नं ६ का जग्गाहरु अधिग्रहण गर्ने गरी मिति :- २०६६।१२।१६ मा गोरखा-पत्रमा सुचना प्रकाशित भएको र प्रकाशित सुचनाको समय अवधि भित्र जग्गाधनीहरु बाट जग्गाधनी प्रमाण पुर्जा सहितका निवेदन दिनुभएका प्राप्त जग्गाधनिहरुका पुर्जा सहितका निवेदनको आधारमा फिल्ड चेक गर्ने परियोजनाबाट नापी कार्यालय बारा का अमिनहरु फिल्ड खटाई ट्रेस नक्सा पेश गर्न लगाईएकोमा सुचना प्रकाशित गर्दा २०२२ साल को नापीको आधारमा ४६ जना जग्गाधनीको सुचना प्रकाशित भएको मा विभिन्न जग्गाधनीहरुबाट कित्ताकाट भै हाल थपघट ६४ जना जग्गाधनी सहित को फिल्ड नक्सा पेश भएकोले सो पेश भए बमोजिम तपसिलका जग्गाधनीहरुको तपसिल बमोजिमको क्षेत्रफल सहितका जग्गाहरुको मुआब्जा बाटोले छोएको प्रतिकठ्ठा रु ३,७५,०००।- (तिन लाख पचहत्तर हजार मात्र) र बाटोले नछोएको प्रतिकठ्ठा रु २,७५,०००।- (दुई लाख पचहत्तर हजार मात्र) का दरले मुआब्जा रकम निर्धारण गर्ने निर्णय गरियो । उल्लेखित मुआब्जा रकम लिन आउँदा संशोधित नामावली सहित आवश्यक का लागि

जग्गा प्राप्ति ऐन २०७९ को दफा ७ बमोजिम सुचना प्रकाशित गर्ने निर्णयथ्यो।

plot5.xls

विरगंज उपमहानगरपालिका कार्यालय

(Land fill site) को अधिग्रहण गर्ने जग्गाको विवरण:- जिल्ला बारा ईटीयाही वडा नं ७

सि.नं.	मो.पा.न	ज.ध.को नाम, थर	ठेगाना	गा.वि.स.	वार्ड नं.	सा.कि.न.	कि.नं.	क्षेत्रफल	कैफियत	कट्टा	रेट	जम्मा
१	१११३	अमृका प्रसाद बरै	विरगंज-१९	इटियाही	७	९४	२४७	०-१-१२-०		१.६०	२७५,००० ००	४४०,००० ००
				इटियाही	७	९६	१७२	०-६-०-०		६.००	२७५,००० ००	१,६५०,००० ००
२	११६८	ब्रहमदेव राउत बरै	विरगंज-१९	इटियाही	७		२४६	०-०-१६-०		०.८०	२७५,००० ००	२२०,००० ००
३	१२१४	सुभगीया बरैनी	विरगंज-१९	इटियाही	७		९१	०-२-०-०		२.००	२७५,००० ००	५५०,००० ००
				इटियाही	७		२६३	०-६-०-०		६.००	२७५,००० ००	१,६५०,००० ००
४	१५३८	लक्ष्मी राउत कुमी	विरगंज-१९	इटियाही	७		९२	०-५-०-०		५.००	२७५,००० ००	१,३७५,००० ००
५	२६१७	श्री कान्ती देवी	विरगंज-१९	इटियाही	७	९५	४७८	०-२-१०-०		२.५०	२७५,०००.००	६८७,५००.००
६	२४५८	मीना देवी तरइन	विरगंज-१९	इटियाही	७	९५	४७९	०-३-१०-०		३.५०	२७५,०००.००	९६२,५०० ००
				इटियाही	७	९८	२९३	०-९-७-८		९.३८	२७५,००० ००	२,५७८,१२५.००
७	१६८९	शम्भु प. चौरसीया	विरगंज-१९	इटियाही	७	९८	२९४	०-१६-०	पश्चिम तर्फबाट १-११-०	१६.००	२७५,००० ००	४,४००,००० ००
				इटियाही	७	९८	२९२	०-८-१२-८		८.६३	२७५,००० ००	२,३७१,८७५.००
८	२०६४	राम कलस प्रसाद बरै	विरगंज-१९	इटियाही	७	२६२	३२५	०-५-०-०		५.००	२७५,००० ००	१,३७५,००० ००
९	२०६५	राम सकल प. चौरसीया	विरगंज-१९	इटियाही	७	२६२	३२७	०-५-०-०		५.००	२७५,००० ००	१,३७५,००० ००
१०	२०८७	शिवशंकर प चौरसीया	विरगंज-१९	इटियाही	७	२६२	३२४	०-५-०-०		५.००	२७५,००० ००	१,३७५,००० ००
११	२०९३	हरिशंकर प बरै	विरगंज-१९	इटियाही	७	२६२	३२६	०-५-०-०		५.००	२७५,००० ००	१,३७५,००० ००
१२	२६४	मोतीया गोठीन	विरगंज-६	इटियाही	७		९७	०-१-०-०		१.००	२७५,००० ००	२७५,००० ००
१३		सुभगीया बरैनी		इटियाही	७		९०	०-१-१०-०		१.५०	२७५,००० ००	४१२,५००.००
				इटियाही	७	८०	२७०	०-०-१०-०		०.५०	२७५,००० ००	१३७,५००.००
१४		बिजेन्द्र प्रसाद चौरसिया		इटियाही	७	८०	२६९	०-०-१०-०		०.५०	२७५,००० ००	१३७,५००.००
१५		काशि राउत बरै		इटियाही	७		९३	०-१२-०-०		१२.००	२७५,००० ००	३,३००,००० ००
१६		जगी राउत कुर्मी		इटियाही	७		९९	०-४-१०-०		४.५०	२७५,००० ००	१,२३७,५०० ००
१७		जयराम प्रसाद बरै		इटियाही	७	९४	२४८	०-०-१६-०		०.८०	२७५,००० ००	२२०,००० ००
१८		श्री कान्ती देवी समेत		इटियाही	७	९४	२४९	०-०-१६-०		०.८०	२७५,००० ००	२२०,००० ००
								५-९-०-०		१०९.००		२९,९७५,००० ००

विरगंज उपमहानगरपालिका कार्यालय

(Land fill site) को अधिग्रहण गर्ने जग्गाको विवरण:- विश्रामपुर वडा नं ९

१९	१८२२	राम सकल प्र चौरसीया	विरगंज-१९	विश्रामपुर	९	७२	१२१५	०-१-५-०		१.२५	२७५,००० ००	३४३,७५० ००
२०	१८४७	शिवशंकर प्र. चौरसीया	विरगंज-१९	विश्रामपुर	९	७२	१२१६	०-१-५-०		१.२५	२७५,००० ००	३४३,७५० ००
२१	१८६३	हरि शंकर प्र. चौरसीया	विरगंज-१९	विश्रामपुर	९	७२	१२१७	०-१-५-०		१.२५	२७५,००० ००	३४३,७५० ००
२२	१२७६	भोला प्र.वरै	विरगंज-१९	विश्रामपुर	९	७३	१००३	०-२-१०-०		२.५०	२७५,००० ००	६८७,५०० ००
२३		मान्ती देवी		विश्रामपुर	९	७३	१००२	०-३-०-०		३.००	२७५,००० ००	८२५,००० ००
२४		लधीया कुर्मीन		विश्रामपुर	९	९९	५०२	०-३-०-०		३.००	२७५,००० ००	८२५,००० ००
				विश्रामपुर	९	९९/६२०	९५०	०-४-१०		४.५०	२७५,००० ००	१,२३७,५०० ००
२५	१४३८	छठी देवी धोवीन	विरगंज-१९	विश्रामपुर	९	९९	६२१	०-२-७-८		२.३८	२७५,००० ००	६५३,१२५.००
२६	१०२०	रामचन्द्र प्रसाद वरै	नगवा-२	विश्रामपुर	९	७४	८०१	०-२-१९-८		२.९८	२७५,००० ००	८१८,१२५.००
				विश्रामपुर	९		७७	०-२-०-०		२.००	२७५,००० ००	५५०,००० ००
२७	८९८	महेन्द्र महतो कोइरी	विरगंज-१९	विश्रामपुर	९		८६	०-३-१५	बाटो	३.७५	२७५,००० ००	१,४०६,२५०.००
				विश्रामपुर	९	८०	४९५	०-८-०-०		८.००	२७५,००० ००	२,२००,००० ००
२८	०६५।९।६को श्रेस्ता	पारमावती देवी वरै	विरगंज-१९	विश्रामपुर	९	७२	१२१८	०-१-१५		१.७५	२७५,००० ००	४८१,२५० ००
२९	०६५।१०।१३को श्रेस्ता	शंकर प्रसाद चौरसीया	विरगंज-१९	विश्रामपुर	९	७४	८०३	०-२-१९-८		२.९८	२७५,००० ००	८१८,१२५.००
				विश्रामपुर	९		९२	०-२-१५-०		२.७५	२७५,००० ००	७५६,२५०.००
३०	०६१।१२।३१को श्रेस्ता	यसोदा देवी वरै चौरसीया	विरगंज-१९	विश्रामपुर	९	७४	८०२	०-६-१४-८		६.७३	२७५,००० ००	१,८४९,३७५.००
				विश्रामपुर	९	७८	५६९	०-६-१०		६.५०	२७५,००० ००	१,७८७,५०० ००
३१	९२	जगदीश राउत वरै	विरगंज-१९	विश्रामपुर	९		८८	०-१-१२-०		१.६०	२७५,००० ००	४४०,००० ००
			विरगंज-१९	विश्रामपुर	९		९०	०-२-५-०		२.२५	२७५,००० ००	६१८,७५० ००
३२	७६	चनरमन राउत वरै	विरगंज-१९	विश्रामपुर	९		९५	०-५-१०-०		५.५०	२७५,००० ००	१,५१२,५०० ००
३३	३६५	रामजीत राउत अहीर	विरगंज-१९	विश्रामपुर	९		९४	०-९-०-०		९.००	२७५,००० ००	२,४७५,००० ००
				विश्रामपुर	९		९७	०-५-०		५.००	२७५,००० ००	१,३७५,००० ००
३४		पृति बर्णवाल निलम अग्रवाल		विश्रामपुर	९	१००/६७५	[illegible]	[illegible]		५.७०	२७५,००० ००	१,५६७,५०० ००
३५		रम्भा देवी		विश्रामपुर	९	१००/६७५	[illegible]	[illegible]		७.००	२७५,००० ००	१,९२५,००० ००
३६	०६६।११।२५को चा.फा.	तारामती यादव	विरगंज-१८	विश्रामपुर	९		८७	०-१-१२	बाटो	१.६०	३७५,००० ००	६००,००० ००
३७		तारामती वरै		विश्रामपुर	९		८९	०-२-५		२.२५	२७५,००० ००	६१८.७५० ००
३८		मान्ती देवी		विश्रामपुर	९	८०	४९४	०-३-०-०		३.००	२७५,००० ००	८२५,००० ००
३९		नकछेद पडित कुम्हार		विश्रामपुर	९	८०	४८०	०-०-१२-०		०.६०	२७५,००० ००	१६५,००० ००
४०		महेन्द्र महतो कोइरी		विश्रामपुर	९		८१	०-३-०-०		३.००	२७५,००० ००	८२५,००० ००
४१		पृति		विश्रामपुर	९		८२	०-१-१०-०	बाटो	१.५०	३७५,००० ००	५६२,५०० ००
४२		शिव राउत अहिर		विश्रामपुर	९		८५	०-२-५-०	बाटो	२.२५	३७५,००० ००	८४३,७५० ००

विरगंज उपमहानगरपालिका कार्यालय

(Land fill site) को अधिग्रहण गर्ने जग्गाको विवरणः- विश्रामपुर वडा नं ९

४३		शान्ती देवी बरैन		विश्रामपुर	९		९६	०-५-१०-०		५.५०	२७,००० ००	१,५१२,५०० ००
४४		रुपनारायण महतो कुशवाह		विश्रामपुर	९		९८	०-१४-०-०		१४.००	२७,००० ००	३,८५०,००० ००
४५		मदन राज, मुन्ना समेत	दशल राउत बरै (मोही)	विश्रामपुर	९	१०१	६७७	०-४-०-०		४.००	२७,००० ००	१,१००,००० ००
४६		मदन राज, मुन्ना समेत	चरमन राउत बरै (मोही)	विश्रामपुर	९	१०२	६७९	०-५-३-८		५.१८	२७,००० ००	१,४२३,१२५.००
४७		मदन राज, मुन्ना समेत	दरोगा राउत कुर्मी	विश्रामपुर	९	१०४	६८१	०-१-०-०		१.००	२७,००० ००	२७,००० ००
४८		मदन राज, मुन्ना समेत	फौदार पहित (मोही)	विश्रामपुर	९	१०५	६८३	०-१-५-०	बाटो	१.२५	३७,००० ००	४६८,७५०.००
४९		जोगिन्दर महतो कोइरी		विश्रामपुर	९	७९	७९	०-८-०-०		८.००	२७,००० ००	२,२००,००० ००
५०		मदन राज, मुन्ना समेत	चरमन राउत बरै (मोही)	विश्रामपुर	९		१०७	०-१९-०-०	बाटो	१९.००	३७,००० ००	७,१२५,००० ००
५१		मदन राज, मुन्ना समेत	जगी राउत कुर्मी (मोही)	विश्रामपुर	९		१०६	०-०-१५-०	बाटो	०.७५	२७,००० ००	३८१,२५० ००
५२		मदन राज, मुन्ना समेत	चरमन राउत बरै (मोही)	विश्रामपुर	९		१०८	०-१-१५-०-०	बाटो	१.७५	३७,००० ००	६२६,२५० ००
५३		मदन राज, मुन्ना समेत	चरमन राउत बरै (मोही)	विश्रामपुर	९		१०९	०-२-१०-०	बाटो	२.५०	३७,००० ००	९३७,५००.००
५४		जगदीश राउत अहीर		विश्रामपुर	९		८४	०-१-१२	बाटो	१.६०	३७,००० ००	६००,००० ००
५५		राम किसुन राउत बरै		विश्रामपुर	९	७५	८९०	०-०-१८		०.१०	२७,००० ००	२४७,५०० ००
५६		जयराम प. बरै		विश्रामपुर	९	७५	८९१	०-०-१८-०		०.१०	२७,००० ००	२४७,५०० ००
५७		छवेसरी देवी दुसाधीन		विश्रामपुर	९		७६	०-७-१०-०		७.५०	२७,००० ००	२,०६२,५०० ००
५८		शान्ति देवी		विश्रामपुर	९	११	६१४	०-४-०		४.००	२७,००० ००	१,१००,००० ००
५९		लक्ष्मी महतो कोइरी		विश्रामपुर	९	९१	६१५	०-८-०		८.००	२७,००० ००	२,२००,००० ००
६०		अमरिका प्रसाद बरै		विश्रामपुर	९	९९/६२०	९४९	०-१-१०		१.५०	२७,००० ००	४१२,५०० ००
६१		रामविलारी राउत बरै		विश्रामपुर	९	९३	१४२४	०-०-१४-७		०.७२	२७,००० ००	१९८,२७५ ००
				विश्रामपुर	९	९३	१४२५	०-०-१४-६		०.७२	२७,००० ००	१९६,६२५ ००
				विश्रामपुर	९	९३	१४२२	०-०-१४-६		०.७२	२७,००० ००	१९६,६२५ ००
				विश्रामपुर	९	९३	१४२३	०-०-१४-६		०.७२	२७,००० ००	१९६,६२५ ००
			—	विश्रामपुर	९	९३	१४२६	०-०-१४-६		०.७२	२७,००० ००	१९६,६२५ ००

विरगंज उपमहानगरपालिका कार्यालय

(Land fill site) को अधिग्रहण गर्ने जग्गाको विवरणः- विश्रामपुर वडा नं ९

६२		जोगीन्दर महतो कोइरी	शिवचन महतो कोइरी	विश्रामपुर	९	८३	६१८	०-०-५		०.२५	२७,००० ००	६८,७५० ००
६३		गुप्तनारायण पसाद	शिवचन महतो कोइरी	विश्रामपुर	९	८३	६१९	०-३-५	बाटो	३.२५	३७,००० ००	१,२१८,७५० ००
६४		वीर बहादुर राउत		विश्रामपुर	९	७८	५७०	०-६-१०		६.५०	२७,००० ००	१,७८७,५००.००
								१०-७-१४-३		२०७.७१		६१,०३९,१४०.००

८०	कित्ता
६४	जग्गा धनि

इटियाही	२३ कित्ता	१८ जना जग्गाधनि	१०९.००	२७,००० ००
विश्रामपुर	४६ कित्ता	३५ जना जग्गाधनि	१६८.५१	२७,००० ००
विश्रामपुर	१५ कित्तामा बाटो	११ जना जग्गाधनि	३१.२०	३७,००० ००

		२९,९७५,००० ००
		४५,३३९,१४० ००
		१४,७००,००० ००
जम्मा		९१,०१४,१४०.००

इटियाही		५-९-०-०
विश्रामपुर		१०-७-१४-३
जम्मा ज वि		१५-१६-१४-३

इटियाही	२९,९७५,००० ००
विश्रामपुर	६१,०३९,१४० ००
जम्मा	९१,०१४,१४०.००

m CA.

② निर्णय : . आधिग्रहण मा परेका जग्गाहरूमा रहेको बाली नाली, बाँट विरुवा तथा रूखवृक्षको मूल्याङ्कन का लागी सरोकार राख्ने सम्बन्धित कार्यालय बाट प्राप्त मूल्याङ्कन र प्रतिवेदन का आधारमा सम्बन्धित जग्गा धनिलाई सो वापत को मूल्य विनु पर्ने भएमा मूल्यांकन दिने गरि निर्णय गरियो।

ANNEX 8

Water Quality Test Results

Summary of Baseline Water Quality Test Results

Sr. No.	Parameters	Unit	Baseline Results (Nov. 29, 2013)		
			U/S Singaha	D/S Singaha	Ground Water
PHYSICAL					
1	pH	-	7.8	7.7	8.3
2	Turbidity	*NTU*	43	47	2
3	Electric Conductivity	*µS/cm*	324	322	482
4	Total Dissolved Solids	*mg/L*	141	140	210
5	Color	*TCU*	< 1	< 1	< 1
6	Total Suspended Solids	*mg/L*	79.9	234.2	< 0.1
7	Lab. Temperature	*° C*	17.0	17.0	17.0
CHEMICAL					
1	Bicarbonate	*mg/L as $CaCO_3$*	159	165	335
2	Chloride	*mg/L as Cl*	11	11	3
3	T. Phosphate	*mg/L as P*	0.1	0.1	< 0.1
4	Sulphate	*mg/L as SO_4*	8	8	< 1
5	Nitrite	*mg/L as N*	3.7	1.8	0.3
6	Nitrate	*mg/L as NO_3*	4.3	2.3	0.9
7	Ammonia	*mg/L as NH_3*	1.5	1.6	< 0.1
8	Calcium	*mg/L as Ca*	33	33	46
9	Iron	*mg/L as Fe*	6.8	11.6	0.1
10	Manganese	*mg/L as Mn*	1.7	1.8	0.5
11	Arsenic	*mg/L as As*	< 0.05	< 0.05	< 0.05
12	Sodium	*mg/L as Na*	16	16	47
13	Zinc	*mg/L as Zn*	< 0.1	< 0.1	< 0.1
14	Copper	*mg/L as Cu*	< 0.1	< 0.1	< 0.1
15	Chromium	*mg/L as Cr*	< 0.05	< 0.05	< 0.05
16	Cadmium	*mg/L as Cd*	< 0.01	< 0.01	< 0.01
17	Lead	*mg/L as Pb*	< 0.01	< 0.01	< 0.01
18	Mercury	*mg/L as Hg*	0.001	< 0.001	< 0.001
19	Nickel	*mg/L as Ni*	< 0.1	< 0.1	< 0.1
20	Selenium	*mg/L as Se*	< 0.01	< 0.01	< 0.01
21	Sulfide	*mg/L as S*	< 1	< 1	< 1
22	C.O.D.	*mg/L*	22	13	< 1
23	B.O.D.	*mg/L*	8	4	< 1
24	Flouride	*mg/L as F*	< 0.1	< 0.1	< 0.1
25	Total Nitrogen	*mg/L as N*	1.1	0.7	< 1
26	Dissolved Oxygen	*mg/L*	9	9	7
27	Permanganate Value	*mg/L as O_2*	< 1	< 1	< 1
28	Phenolic Compound		ND	ND	ND
29	Oil and Grease		ND	ND	ND
BACTERIOLOGICAL					
1	Faecal Coliform	*Cfu / 100 ml*	Nil	Nil	Nil

Note:
1) ND = Not Detected
2) Baseline ground water quality tested parameters are found to be within the limit of NDWQS except that of Manganese.
3) Detailed test results are kept in **Annex – 8**
4) The water quality monitoring will be carried out taking into consideration parameters tested during baseline survey.

CEMAT
WATER LAB P. LTD.
(Water Analysis, Treatment Consultancy & Environment Research)

Tel. No.4416389, 4436667
Fax: 977 -1- 4417690, P.O.Box : 3953
E-mail : cematlab@wlink.com.np
info@cematwaterlab.com.np
Web. : www.cematwaterlab.com.np
Pawan Marg-33, Maitidevi
Kathmandu, Nepal

WATER ANALYSIS REPORT

Sender :- Cemat Consultant P. Ltd	Sample No. :- 1	Lab No. :- 1273/13
Collector :- CEMAT Water Lab P. Ltd*	Location :- Birgunj	District :- Parsa
Source :- Upstream -1, Singha River	Collection Date :- 28 Nov, 2013	Time :- (8:00 AM)
Receipt Date :- 29 Nov , 2013	Analysis Date :-29 Nov , 2013	

Parameters	Unit	Result	Method
PHYSICAL			
pH	-	7.8	*ISO 10523:1994 (E)*
Turbidity	*NTU*	43	*2130 B, APHA,17th Ed.*
Electric conductivity	*µS/cm*	324	*ISO 7888:1985*
Total dissolved solids	*mg/L*	141	*2540 C, APHA*
Color	*TCU*	< 1	*ISO 7887:1994 (E), Section 3*
Total Suspended Solids	*mg/L*	79.9	*2540 D, APAH*
Lab.Temperature	^0C	17.0	*Thermometer*
CHEMICAL			
Bicarbonate	*mg/L as* $CaCO_3$	159	*ISO 9963-1:1994*
Chloride	*mg/L as Cl*	11	*ISO 9297:1989*
T. Phosphate	*mg/L as P*	0.1	*ISO 6878:1998(E)*
Sulphate	*mg/L as* SO_4	8	*4500-*SO_4^{2-} *E, APHA 17th Ed.*
Nitrite	*mg/L as N*	3.7	*4500-NO2` APHA17th edn*
Nitrate	*mg/L as* NO_3	4.3	*ISO7890-3*
Ammonia	*mg/L as* NH_3	1.5	*4500-NH3C, APHA 17th edn*
Calcium	*mg/L as Ca*	33	*3500-Ca D APHA 17th edn*
Iron	*mg/L as Fe*	6.8	*ISO 8288:1998*
Manganese	*mg/L as Mn*	1.7	*ISO 8288:1998*
Arsenic	*mg/L as As*	< 0.05	*ISO 11969:1996*
Sodium	*mg/L as Na*	16	*3500- B Na , APHA 17edition*
Zinc	*mg/L as Zn*	< 0.1	*3111, APHA 17th Ed.*
Copper	*mg/L as Cu*	< 0.1	*3111, APHA 17th Ed.*
Chromium	*mg/L as Cr*	< 0.05	*3500-Cr, APHA 17th Ed.*
Cadmium	*mg/L as Cd*	< 0.01	*3111, APHA 17th Ed.*
Lead	*mg/L as Pb*	< 0.01	*3111, APHA 17th Ed.*
Mercury	*mg/L as Hg*	0.001	*ISO 5666:1999*
Nickel	*mg/L as Ni*	< 0.1	*3111, APHA 17th Ed.*
Selenium	*mg/L as Se*	< 0.01	*3500-Se C, APHA 17th Ed.*
Sulfide	*mg/L as S*	< 1	*4500-S- E, APHA 17th Ed.*

Continue.....

CEMAT
WATER LAB P. LTD.
(Water Analysis, Treatment Consultancy & Environment Research)

Tel. No.4416389, 4436667
Fax: 977 -1- 4417690, P.O.Box : 3953
E-mail : cematlab@wlink.com.np
info@cematwaterlab.com.np
Web. : www.cematwaterlab.com.np
Pawan Marg-33, Maitidevi
Kathmandu, Nepal

Continue of Lab No. 1273/13

C.O.D.	*mg/L*	22	*5220 B, APHA 17th Ed.*
B.O.D.	*mg/L*	8	*5210 B, APHA 17th Ed.*
Flouride	*mg/L as F*	< 0.1	*4500-F⁻ D, APHA 17th Ed.*
Total Nitrogen	*mg/L as N*	1.1	*ISO 5663:1984(E)*
Dissolved Oxygen	*mg/L*	9	*4500-O-C , APHA 17th Ed.*
Permanganate Value	*mg/L as O_2*	< 1	*Permanganimetric Method*
Phenolic Compound**		ND	*GC-MS*
Oil and Grease**		ND	*GC-MS*
BACTERIOLOGICAL			
Faecal Coliform	*Cfu/100 ml*	Nil	*9222 D APHA,17edition*

* Sampling as per ISO 5667-6
** Subcontracted parameters ND= Not Detected

Parameters	Unit	Result	Method
Bicarbonate	*mg/L as HCO_3*	97	*ISO 9963-1:1994*
Nitrate	*mg/L as N*	1.0	*ISO7890-3*
Ammonia	*mg/L as N*	1.2	*4500-NH3C, APHA 17th edn*

Analyzed by: Date: 29 Dec.'13

Checked by:

Authorized sign: Date: 29 Dec, '13

CEMAT WATER LAB (P.) LTD.

नेपाल सरकार
विज्ञान, प्रविधि तथा वातावरण मन्त्रालय
सिंहदरबार, काठमाण्डौं

Note: - The results refer only to the parameters tested of the samples provided/collected for analysis. Endorsement of products is neither inferred nor implied.
- The reproduction of this report wholly or partly cannot be used as an evidence in the Court of law and should not be used in any advertising media without prior written permission from us.

CEMAT
WATER LAB P. LTD.
(Water Analysis, Treatment Consultancy & Environment Research)

Tel. No.4416389, 4436667
Fax: 977 -1- 4417690, P.O.Box : 3953
E-mail : cematlab@wlink.com.np
info@cematwaterlab.com.np
Web. : www.cematwaterlab.com.np
Pawan Marg-33, Maitidevi
Kathmandu, Nepal

WATER ANALYSIS REPORT

Sender :- Cemat Consultant P. Ltd	Sample No. :- 1	Lab No. :- 1274/13
Collector :- CEMAT Water Lab P. Ltd*	Location :- Birgunj	District :- Parsa
Source :- Downstream -2, Singha River	Collection Date :- 28 Nov, 2013	Time :- (8:15 AM)
Receipt Date :- 29 Nov , 2013	Analysis Date :-29 Nov , 2013	

Parameters	Unit	Result	Method
PHYSICAL			
pH	-	7.7	*ISO 10523:1994 (E)*
Turbidity	*NTU*	47	*2130 B, APHA,17th Ed.*
Electric conductivity	*µS/cm*	322	*ISO 7888:1985*
Total dissolved solids	*mg/L*	140	*2540 C, APAH*
Color	*TCU*	< 1	*ISO 7887:1994 (E), Section 3*
Total Suspended Solids	*mg/L*	234.2	*2540 D, APAH*
Lab.Temperature	^0C	17.0	*Thermometer*
CHEMICAL			
Bicarbonate	*mg/L as* $CaCO_3$	165	*ISO 9963-1:1994*
Chloride	*mg/L as Cl*	11	*ISO 9297:1989*
T. Phosphate	*mg/L as P*	0.1	*ISO 6878:1998(E)*
Sulphate	*mg/L as* SO_4	8	*4500-*SO_4^{2-} *E, APHA 17th Ed.*
Nitrite	*mg/L as N*	1.8	*4500-NO2 APHA17th edn*
Nitrate	*mg/L as* NO_3	2.3	*ISO7890-3*
Ammonia	*mg/L as* NH_3	1.6	*4500-NH3C, APHA 17th edn*
Calcium	*mg/L as Ca*	33	*3500-Ca D APHA 17th edn*
Iron	*mg/L as Fe*	11.6	*ISO 8288:1998*
Manganese	*mg/L as Mn*	1.8	*ISO 8288:1998*
Arsenic	mg/L as As	< 0.05	*ISO 11969:1996*
Sodium	mg/L as Na	16	*3500- B Na , APHA 17edition*
Zinc	mg/L as Zn	< 0.1	*3111, APHA 17th Ed.*
Copper	mg/L as Cu	< 0.1	*3111, APHA 17th Ed.*
Chromium	mg/L as Cr	< 0.05	*3500-Cr, APHA 17th Ed.*
Cadmium	mg/L as Cd	< 0.01	*3111, APHA 17th Ed.*
Lead	mg/L as Pb	< 0.01	*3111, APHA 17th Ed.*
Mercury	mg/L as Hg	< 0.001	*ISO 5666:1999*
Nickel	mg/L as Ni	< 0.1	*3111, APHA 17th Ed.*
Selenium	mg/L as Se	< 0.01	*3500-Se C, APHA 17th Ed.*
Sulfide	*mg/L as S*	< 1	*4500-S- E, APHA 17th Ed.*

Continue.....

CEMAT
WATER LAB P. LTD.
(Water Analysis, Treatment Consultancy & Environment Research)

Tel. No.4416389, 4436667
Fax: 977 -1- 4417690, P.O.Box : 3953
E-mail : cematlab@wlink.com.np
info@cematwaterlab.com.np
Web. : www.cematwaterlab.com.np
Pawan Marg-33, Maitidevi
Kathmandu, Nepal

Continue of Lab No. 1274/13

Parameters	Unit	Result	Method
CHEMICAL			
C.O.D.	mg/L	13	*5220 B, APHA 17th Ed.*
B.O.D.	mg/L	4	*5210 B, APHA 17th Ed.*
Flouride	mg/L as F	< 0.1	*4500-F⁻ D, APHA 17th Ed.*
Total Nitrogen	mg/L as N	0.7	*ISO 5663:1984(E)*
Dissolved Oxygen	mg/L	9	*4500-O-C , APHA 17th Ed.*
Permanganate Value	mg/L as O_2	< 1	*Permanganimetric Method*
Phenolic Compound**		ND	*GC-MS*
Oil and Grease**		ND	*GC-MS*
BACTERIOLOGICAL			
Faecal Coliform	*Cfu/100 ml*	Nil	*9222 D APHA,17edition*

* Sampling as per ISO 5667-6

** Subcontracted parameters ND= Not Detected

Parameters	Unit	Result	Method
Bicarbonate	*mg/L as HCO_3*	101	*ISO 9963-1:1994*
Nitrate	*mg/L as N*	0.5	*ISO7890-3*
Ammonia	*mg/L as N*	1.3	*4500-NH3C, APHA 17th edn*

Analyzed by: Date: 29 Dec,'13

Checked by:

Authorized sign: Date: 29 Dec, '13

CEMAT WATER LAB (P.) LTD.

नेपाल सरकार
विज्ञान, प्रविधि तथा वातावरण मन्त्रालय

Note: - The results refer only to the parameters tested of the samples provided/collected for analysis. Endorsement of products is neither inferred nor implied.
- The reproduction of this report wholly or partly cannot be used as an evidence in the Court of law and should not be used in any advertising media without prior written permission from us.

CEMAT
WATER LAB P. LTD.
(Water Analysis, Treatment Consultancy & Environment Research)

Tel. No.4416389, 4436667
Fax: 977 -1- 4417690, P.O.Box : 3953
E-mail : cematlab@wlink.com.np
info@cematwaterlab.com.np
Web. : www.cematwaterlab.com.np
Pawan Marg-33, Maitidevi
Kathmandu, Nepal

WATER ANALYSIS REPORT

Sender :- Cemat Consultant P. Ltd	Sample No. :- 1	Lab No. :- 1275/13
Collector :- CEMAT Water Lab P. Ltd*	Location :- Birgunj	District :- Parsa
Source :- Ground Water	Collection Date :- 28 Nov, 2013	Time :- (9:05 AM)
Receipt Date :- 29 Nov , 2013	Analysis Date :-29 Nov , 2013	

#South West Corner of Landfield Site at bridge collection

Parameters	Unit	Result	NDWQS	Method
PHYSICAL				
pH	-	8.3	*6.5-8.5*	*ISO 10523:1994 (E)*
Turbidity	*NTU*	2	*5 (10) (Max)*	*2130 B, APHA,17th Ed.*
Electric conductivity	*µS/cm*	482	*1500 (Max)*	*ISO 7888:1985*
Total dissolved solids	*mg/L*	210	*1000 (Max)*	*2540 C, APAH 17edition*
Color	*TCU*	< 1	*5 (15) (Max)*	*ISO 7887:1994 (E), Section 3*
Total Suspended Solids	*mg/L*	< 0.1	-	*2540 D, APAH 17edition*
Lab.Temperature	^0C	17.0	-	*Thermometer*
CHEMICAL				
Bicarbonate	*mg/L as* $CaCO_3$	335	-	*ISO 9963-1:1994*
Chloride	*mg/L as Cl*	3	*250 (Max)*	*ISO 9297:1989*
T. Phosphate	*mg/L as P*	< 0.1	-	*ISO 6878:1998(E)*
Sulphate	*mg/L as* SO_4	< 1	*250 (Max)*	*4500-*SO_4^{2-} *E, APHA 17th Ed.*
Nitrite	*mg/L as N*	0.3	-	*4500-NO2 APHA17th edn*
Nitrate	*mg/L as* NO_3	0.9	*50 (Max)*	*ISO7890-3*
Ammonia	*mg/L as* NH_3	< 0.1	*1.5 (Max)*	*4500-NH3C, APHA 17th edn*
Calcium	*mg/L as Ca*	46	-	*3500-Ca D APHA 17th edn*
Iron	*mg/L as Fe*	0.1	*0.3 (3)(Max)*	*ISO 8288:1998*
Manganese	*mg/L as Mn*	0.5	*0.2 (Max)*	*ISO 8288:1998*
Arsenic	mg/L as As	< 0.05	*0.05 (Max)*	*ISO 11969:1996 (AAS)*
Sodium	mg/L as Na	47	-	*3500- B Na , APHA 17edition*
Zinc	mg/L as Zn	< 0.1	*3 (Max)*	*3111, APHA 17th Ed.*
Copper	mg/L as Cu	< 0.1	*1 (Max)*	*3111, APHA 17th Ed.*
Chromium	mg/L as Cr	< 0.05	*0.05 (Max)*	*3500-Cr, APHA 17th Ed.*
Cadmium	mg/L as Cd	< 0.01	*0.003 (Max)*	*3111, APHA 17th Ed.*
Lead	mg/L as Pb	< 0.01	*0.01 (Max)*	*3111, APHA 17th Ed.*
Mercury	mg/L as Hg	< 0.001	*0.001 (Max)*	*ISO 5666:1999*
Nickel	mg/L as Ni	< 0.1	-	*3111, APHA 17th Ed.*
Selenium	mg/L as Se	< 0.01	-	*3500-Se C, APHA 17th Ed.*
Sulfide	*mg/L as S*	< 1	-	*4500-S- E, APHA 17th Ed.*

Continue.....

CEMAT
WATER LAB P. LTD.
(Water Analysis, Treatment Consultancy & Environment Research)

Tel. No.4416389, 4436667
Fax: 977 -1- 4417690, P.O.Box : 3953
E-mail : cematlab@wlink.com.np
info@cematwaterlab.com.np
Web. : www.cematwaterlab.com.np
Pawan Marg-33, Maitidevi
Kathmandu, Nepal

Continue of Lab No. 1275/13

Parameters	Unit	Result	NDWQS	Method
CHEMICAL				
C.O.D.	mg/L	< 1	-	*5220 B, APHA 17th Ed.*
B.O.D.	mg/L	< 1	-	*5210 B, APHA 17th Ed.*
Flouride	mg/L as F	< 0.1	-	*4500-F⁻ D, APHA 17th Ed.*
Total Nitrogen	mg/L as N	< 1	-	*ISO 5663:1984(E)*
Dissolved Oxygen	mg/L	7	-	*4500-O-C , APHA 17th Ed.*
Permanganate Value	mg/L as O_2	< 1	-	*Permanganimetric Method*
Phenolic Compound**		ND		*GC-MS*
Oil and Grease**		ND		*GC-MS*
BACTERIOLOGICAL				
Faecal Coliform	*Cfu/100 ml*	Nil	Nil	*9222 D APHA,17edition*

NDWQS= National Drinking Water Quality Standard (2062) ( )=If there is no other alternative source of water

* Sampling as per ISO 5667-6

** Subcontracted parameters ND= Not Detected

Remarks: The observed values of all the tested parameters are found to be within the limit of NDWQS, except that of **Manganese.**

Parameters	Unit	Result	Method
Bicarbonate	*mg/L as HCO_3*	204	*ISO 9963-1:1994*
Nitrate	*mg/L as N*	0.2	*ISO7890-3*
Ammonia	*mg/L as N*	< 0.1	*4500-NH3C, APHA 17th edn*

Analyzed by: Renu
Date: 29 Dec, '13

Checked by: Raj Bhandari

Authorized sign:
Date: 29 Dec, '13

CEMAT WATER LAB (P.) LTD.

नेपाल सरकार
वित्त, प्रविधि तथा वातावरण मन्त्रालय
सिंहदरबार, काठमाडौं

Note: - The results refer only to the parameters tested of the samples provided/collected for analysis. Endorsement of products is neither inferred nor implied.
- The reproduction of this report wholly or partly cannot be used as an evidence in the Court of law and should not be used in any advertising media without prior written permission from us.