

**Environmental Impact Assessment (EIA)
Of
United Mission Hospital Tansen, Lumbini
Province, Palpa**

**Submitted To
Government of Nepal
Ministry of Forests and Environment
Singha Durbar, Kathmandu**

**Through
Ministry of Health and Population
Government of Nepal
Ramsahpath, Kathmandu**

**Submitted By:
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कार्यकारी सौराश

युनाईटेड मिशन अस्पताल तानसेन आयोजनाको प्रस्तावक युनाईटेड मिसन टु नेपाल मेडिकल एण्ड डेभलपमेन्ट ट्रष्ट हो। प्रस्तावकको पूरा नाम र ठेगाना निम्न बमोजिम रहेको छ।

प्रस्तावकको नाम र ठेगाना

युनाईटेड मिसन टु नेपाल मेडिकल एण्ड डेभलपमेन्ट ट्रष्ट

ठेगाना: काठमाडौं महानगरपालिका-११, थापाथली, काठमाडौं

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आयोजनाको परिचय

युनाईटेड मिशन अस्पताल तानसेन पाल्पा जिल्लाको तानसेन नगरपालिका वडा नं १ मा अवस्थित रहेको छ। हाल यो अस्पताल १६९ शैय्या क्षमतामा संचालन भइरहेको छ। प्रस्तावकले १६९ शैय्यामा सञ्चालित युनाईटेड मिशन अस्पताल तानसेनको स्तरउन्नति गरी २०० शैय्यामा सञ्चालन गर्न प्रस्ताव गरेको हो। हाल यो अस्पतालल युनाईटेड मिसन टु नेपाल मेडिकल एण्ड डेभलपमेन्ट ट्रष्ट अन्तर्गत सञ्चालन भइरहेको छ। युनाईटेड मिशन अस्पताल तानसेनको स्थायी लेखा नं ६०१५३७४५३ रहेको छ।

यस अस्पतालबाट दिइने सेवाहरुमा बहिरङ्ग सेवा (जनरल मेडिसिन, जनरल सर्जरी, एनसथेसिओलोजी, यौन रोग, बाल रोग, दन्त चिकित्सा, छाला रोग आदि), अन्तरङ्ग सेवा तर्फ (मेडिकल वार्ड, सर्जिकल वार्ड आदि), निदानात्मक सेवातर्फ (प्रयोगशाला एक्सरे, इ.सि.जि, इन्डोसकोपी आदि), अपरेशन थिएटर, प्याथोलोजि सेवा र २४ सै घण्टा आकस्मिक र औषधि विक्री सेवा आदि प्रदान गर्दै आईरहेको छ। यस अस्पतालमा हाल बेड अकुपेन्सी ८३.१२ प्रतिशत रहेको छ। यो अस्पताल १३५७५.३३ वर्ग मिटर क्षेत्रफल जग्गामा अवस्थित रहेको छ जसमा २ वटा मुख्य अस्पताल भवन निर्माण गरिएको छ। यसका अतिरिक्त खुल्ला क्षेत्र (२७१५.०६७ वर्ग मि.), बगैचा (२०३६.२९ वर्ग मि.) तथा पाकिङ्ग व्यवस्थापनको लागि (३३९३.८३ वर्ग मि.) जमिन छुट्याईएको छ। हाल अस्पतालमा करिब १८८ जनशक्तिको कार्यरत रहेका छन्।

यस अस्पतालमा १६९ शैय्यामा सञ्चालन हुदा करिब ५०,००० लिटर प्रतिदिन पानी आवश्यक पर्ने देखिन्छ भने प्रतिदिन ६०५.३ किलोग्राम अस्पतालजन्य फोहरमैला उत्सर्जन हुने देखिन्छ। यस अस्पताललाई १६९ बाट २०० शैय्यामा स्तरउन्नति गर्दा अस्पतालबाट

प्रतिदिन ७२१.३ किलोग्राम अस्पतालजन्य फोहरमैला उत्सर्जन हुने देखिन्छ भने करिब ७०,००० लिटर प्रतिदिन पानी आवश्यक पर्ने देखिन्छ ।

वातावरणीय प्रभाव मूल्याङ्कन अध्ययनको औचित्यता

वातावरण संरक्षण नियमावली, २०७७ को अनुसूची-३ (ख) स्वास्थ्य क्षेत्र अन्तर्गत १०० शैय्याभन्दा बढीको अस्पताल, नर्सिङ्ग होम वा चिकित्सा व्यवसाय सञ्चालन गर्ने प्रस्तावकले आयोजना निर्माण गर्नुपूर्व वातावरणीय प्रभाव मूल्याङ्कन प्रतिवेदन तयार गरी उक्त प्रतिवेदन स्वीकृत गराउनु पर्ने प्रावधान रहेको छ। युनाईटेड मिशन अस्पताल तानसेनले १६९ शैय्याबाट २०० शैय्यामा स्तरोन्नति गर्न प्रस्ताव गरेको हुनाले वातावरणीय प्रभाव मूल्याङ्कन गरिएको हो। यस आयोजनाको वातावरणीय प्रभाव मूल्याङ्कन सम्बन्धी क्षेत्र निर्धारण र कार्यसूची वन तथा वातावरण मन्त्रालयबाट मिति २०७८/०१/१२ मा स्वीकृत भएको थियो।

अध्ययन विधि

यस आयोजनाको वातावरणीय प्रभाव मूल्याङ्कन अध्ययन प्रतिवेदन वातावरण संरक्षण ऐन २०७६, वातावरण संरक्षण नियमावली, २०७७ तथा स्वीकृत क्षेत्र निर्धारण र कार्यसूची अनुसार तयार गरिएको हो। वातावरणीय प्रभाव मूल्याङ्कन अध्ययनका क्रममा डेस्क अध्ययन र क्षेत्रगत अध्ययन गरिएको थियो। डेस्क अध्ययन अन्तर्गत यस आयोजनाको इन्जिनियरिङ्ग नक्साहरूको अध्ययन, माटो परीक्षण प्रतिवेदन, टोपो नक्साहरूको अध्ययन तथा सम्बन्धित विषयमा प्रकाशित दस्तावेजहरूको अध्ययन, प्रश्नावली/ चेकलिस्टहरू तयार गरिएको थियो।

यस बाहेक अध्ययन टोलीद्वारा मिति २०७८/०४/२९ देखि २०७८/०५/०२ सम्म स्थलगत अध्ययन गरी आवश्यक तथ्याङ्क सङ्कलन गरिएको थियो। त्यस क्रममा स्थलगत अवलोकन, स्थानीयसँग छलफल, मुख्य जानकार व्यक्तिसँग अन्तर्वार्ता आदि गरिएको थियो। यस प्रतिवेदन तयारीका क्रममा आयोजना प्रभावित क्षेत्रमा मिति २०७८/०४/३० गते सार्वजनिक सुनुवाई पनि गरिएको थियो। सार्वजनिक सुनुवाईको क्रममा उठान भएका रायसुझावहरू यस प्रतिवेदनमा समावेश गरिएको छ। यसरी सङ्कलन गरिएका तथ्याङ्कहरूलाई राष्ट्रिय वातावरणीय प्रभाव मूल्याङ्कन निर्देशिका, २०५० बमोजिम विश्लेषण गरिएको छ। सोही अनुरूपको वातावरणीय प्रभाव अभिवृद्धि तथा न्यूनीकरणका उपायहरू पनि प्रस्ताव गरिएका छन्।

कानूनी दस्तावेजहरूको पुनरावलोकन

यस आयोजनाको वातावरणीय प्रभाव मूल्याङ्कन अध्ययन प्रतिवेदन तयार गर्दा पुनरालोकन गरिएका मुख्य कानूनी दस्तावेजहरूमा राष्ट्रिय स्वास्थ्य नीति २०७६, वातावरण संरक्षण ऐन २०७६, वातावरण संरक्षण नियमावली २०७७, राष्ट्रिय वातावरण प्रभाव मूल्याङ्कन २०५०, स्वास्थ्य सेवा फोहर व्यवस्थापन निर्देशिका २०७१, स्वास्थ्य सेवा स्थापना, सञ्चालन तथा स्तरोन्नति मापदण्ड सम्बन्धि निर्देशिका २०७०, फोहरमैला व्यवस्थापन ऐन, २०६८, फोहरमैला व्यवस्थापन नियमावली २०७०, भवन संहिता ऐन २०५५, श्रम ऐन २०७४,

स्थानीय सरकार सञ्चालन ऐन, २०७४, स्वास्थ्य संस्था संचालन मापदण्ड, २०७७, जनस्वास्थ्य सेवा ऐन, २०७५, जनस्वास्थ्य सेवा नियमावली, २०७७ आदि रहेका छन्। यस बाहेक आयोजनासँग सम्बन्धित अन्तराष्ट्रिय सन्धिहरूको पनि पुनरावलोकन गरिएको थियो।

विद्यमान वातावरणीय अवस्था

भौतिक वातावरण

भौगोलिक दृष्टिकोणबाट पाल्पा जिल्ला नेपालको पहाडी भेग अन्तर्गत पर्दछ। पाल्पा जिल्लाको कुल क्षेत्रफल १३७३ वर्ग कि.मी रहेको छ भने तानसेन नगरपालिकाले पाल्पा जिल्लाको १०९.८ वर्ग कि.मी क्षेत्रफल ओगटेको छ। युनाईटेड मिशन अस्पताल तानसेनको भौगोलिक अवस्थिति उत्तरी अक्षांश २७° ४०' २०" तथा पूर्वी देशान्तर ८५° २६' ३५" रहेको छ। यस क्षेत्रमा उपोष्ण किसिमको हावापानी पाइन्छ। यस क्षेत्रको अधिकतम औसत तापक्रम ३५.०५° सेन्टीग्रेड रहेको छ भने न्यूनतम औसत तापक्रम ८.५५° सेन्टीग्रेड सम्म रहने गरेको पाइन्छ। युनाईटेड मिशन अस्पताल तानसेन समुन्द्री सतहबाट करिब १३५० मि. उचाईमा अवस्थित रहेको छ।

जैविक वातावरण

युनाईटेड मिशन अस्पताल तानसेन आफ्नै जग्गामा सञ्चालन भइरहेको छ। आयोजना स्थल वरपर स्थानीय ठाउँमा पाईने विभिन्न प्रकारको वनस्पतिहरू रहेका छन् जस अन्तर्गत आँप, चिलाउने, बाँस, धूपी, ओखर जस्ता वृक्षहरू पनि रहेका छन्। आयोजना स्थल वरपर लोपोन्मुख जंगली जनावरको बसोबास भने नरहेको तर यस क्षेत्र वरपर पाईने चरा प्रजातिहरूमा भंगेरा, परेवा, काग, ढुकुर, मैना, चिवे, दाङ्गे आदि रहेका छन्।

सामाजिक, आर्थिक तथा साँस्कृतिक वातावरण

राष्ट्रिय जनसंख्या तथा घरधुरी सर्वेक्षण, २०६८ को जनगणना अनुसार पाल्पा जिल्लाको कुल घरहरूको संख्या ५९,२९१ रहेको छ भने पाल्पा जिल्लाको कुल जनसंख्या २६१९८० (महिला १,४५,३४० र पुरुष १,१५,८४०) रहेको छ। त्यसैगरी राष्ट्रिय जनसंख्या तथा घरधुरी सर्वेक्षण, २०६८ को जनगणना अनुसार तानसेन नगरपालिकामा कुल घरहरूको संख्या ८४९१ रहेको छ भने कुल जनसंख्या २९,०९५ (महिला १५,३५३ र पुरुष १३,७४१) रहेको छ। त्यसैगरी तानसेन नगरपालिका वडा नं १ को कुल जनसंख्या ६४५१ रहेको छ भने जसमध्ये पुरुष जनसंख्या ३०७५ र महिला जनसंख्या ३३७६ रहेको छ।

तानसेन नगरपालिकामा बसोबास गर्ने मुख्य जनजातीहरूमा ब्राम्हण (२६.१२%), नेवार (१०.८३%), मगर (२९.२५%), क्षेत्री (१६.२८%), कामी (५.५८%), ठकुरी (१.१२%), सार्की (२.०५%) आदि पर्दछन्। यस नगरपालिकामा हिन्दु धर्मावलम्बीहरू बढी रहेका छन् भने अन्य धर्मावलम्बीहरूमा मुस्लिम, बौद्ध, क्रिस्चियन रहेका छन्।

वातावरणीय प्रभावहरू

सकारात्मक प्रभावहरू

आयोजना सञ्चालनको चरणमा निम्न अनुसारका मुख्य सकारात्मक प्रभावहरू रहने अनुमान गरिएका छन्।

- स्थानीय जनतालाई सर्वसुलभ स्वास्थ्य सेवामा पहुँच
- स्थानीय अर्थतन्त्रमा वृद्धि
- स्थानीय जनतालाई सिप अनुसारको रोजगारीमा अवसर
- संस्थागत सामाजिक उत्तरदायित्व अन्तर्गत सहयोग कार्यक्रमबाट स्थानीय जनता लाभान्वित हुनेछन्।
- गरीब तथा असाहय व्यक्तिको लागि निःशुल्क उपचार गरिनेछ।

नकारात्मक प्रभावहरू

भौतिक वातावरण

आयोजना सञ्चालनको अवधिमा भौतिक वातावरणमा पर्न सक्ने नकारात्मक प्रभावहरू देहाय बमोजिमका रहेका छन्।

- अस्पतालजन्य फोहरमैला उत्सर्जनबाट पर्न सक्ने प्रभाव
- ठोस फोहरमैला उत्सर्जनबाट पर्न सक्ने प्रभाव
- फोहोरपानीको उत्सर्जनबाट पर्न सक्ने प्रभाव
- वायु तथा ध्वनि प्रदूषण
- सवारी साधन पार्किङबाट पर्न सक्ने प्रभाव
- ढल निकासको व्यवस्थापनको कमिले पर्न सक्ने प्रभाव
- उच्च ऊर्जाको खपतबाट पर्न सक्ने प्रभाव
- प्राकृतिक प्रकोपका कारणले पर्न सक्ने प्रभाव
- विकिरण उत्सर्जनबाट पर्न सक्ने प्रभाव
- रासायनिक पदार्थको प्रयोगबाट पर्न सक्ने प्रभाव
- भूमिगत पानीको स्रोत प्रदूषण हुने खतरा

जैविक वातावरण

अस्पतालको भवन निजी जग्गामा सञ्चालन भईरहेको हुँदा कुनै प्रकारको वनस्पतिहरू काटिने छैनन् तर आयोजना रहने स्थान वरपर हरित क्षेत्र निर्माण तथा संरक्षणमा भने केही चुनौतीहरू रहेका छन्।

सामाजिक-आर्थिक तथा साँस्कृतिक वातावरण

आयोजना सञ्चालन अवधिमा सामाजिक-आर्थिक तथा साँस्कृतिक वातावरण पर्न सक्ने मुख्य नकारात्मक प्रभावहरू निम्न बमोजिम रहेका छन् ।

- पेसागत स्वास्थ्य तथा सुरक्षामा प्रभाव
- अस्पताल क्षेत्रमा सरसफाई कमीका कारण पर्न सक्ने प्रभाव
- शुद्ध पिउने पानीको अभावका कारण आउने चुनौती
- अस्पतालका कर्मचारी र स्थानीय व्यक्ति बीच उत्पन्न हुने मनमुटाव
- स्थानीयबाट आउन सक्ने गुनासोहरू
- अस्पतालबाट दिने सेवाहरूको प्रभावकारीताको कमीबाट पर्ने प्रभाव

विकल्प विश्लेषण

प्रस्तावित आयोजनाको स्थान, डिजाइन, वैकल्पिक प्रविधि, समय तालिका र कार्यन्वयन, वातावरणीय व्यवस्थापन प्रणाली, जोखिम विश्लेषण र आयोजना हुँदा वा नहुँदाको अवस्थाको विश्लेषण मुख्य रूपले विकल्प विश्लेषणको अङ्ग भित्र पर्दछन् । यो आयोजना हाल सञ्चालनमा रहेको र यसलाई स्तरोन्नति गर्ने भएकोले स्थानको विकल्प विश्लेषण गरिएको छैन । अन्य विकल्पहरू जस्तै डिजाइन, वैकल्पिक प्रविधि, समय तालिका र कार्यन्वयन, वातावरणीय व्यवस्थापन प्रणाली, जोखिम विश्लेषण र आयोजना हुँदा वा नहुँदाको अवस्थाको विश्लेषण गरिएकोमा हाल यस आयोजनाको लागि अवलम्बन गरिएका विकल्पहरू प्राविधिक, आर्थिक र वातावरणीय दृष्टिकोणबाट उत्कृष्ट देखिन्छ ।

वातावरणीय प्रभाव अभिवृद्धि तथा न्यूनीकरणका उपायहरू

सकारात्मक प्रभाव अभिवृद्धिकरणका उपायहरू

आयोजना सञ्चालनका कारणले पर्न सक्ने सकारात्मक प्रभावहरूलाई अभिवृद्धि गर्नका निम्ति निम्न उपायहरू प्रयोग गरिने छन् ।

- स्थानीय जनतालाई दक्षता अनुसार रोजगारीमा अवसर प्रदान गरिनेछ ।
- प्राविधिक सिपको बढोत्तरी गरिने छन् ।
- स्वास्थ्यसँग सम्बन्धित तालिमहरू सञ्चालन गरिने छन् ।
- सर्वसुलभ तथा गुणस्तरीय स्वास्थ्य सेवा प्रदान गरिनेछ ।
- समय समयमा निःशुल्क स्वास्थ्य शिविर सञ्चालन गरिनेछ ।
- संस्थागत सामाजिक उत्तरदायित्व कार्यक्रमहरू सञ्चालन गरिने छन् ।
- अस्पतालमा उपचारका लागि आउने विपन्न, असहाय, बेवारिसे बिरामीका लागि निःशुल्क उपचार गराईनेछ ।

सकारात्मक प्रभावहरू अभिवृद्धि गर्नको लागि ने.रु. १६,००,००० (सोह लाख) प्रस्ताव गरिएको छ । यस बाहेक संस्थागत सामाजिक उत्तरदायित्व कार्यक्रम प्रचलित कानून बमोजिम सम्बन्धित निकायसँगको परामर्शमा सञ्चालन गरिनेछ ।

नकारात्मक प्रभाव न्यूनीकरणका उपायहरू

भौतिक वातावरण

अस्पतालजन्य फोहरमैला तथा संक्रमित फोहर व्यवस्थापनको लागि यस अस्पतालको प्रत्येक वार्डबाट निस्कने फोहरहरूलाई स्रोतमा नै वर्गीकरण गरेर तीन रंगका छुट्टाछुट्टै कन्टेनरमा सङ्कलन गरी फोहरको प्रकृति अनुसार प्रशोधन र व्यवस्थापन गरिएको छ। रातो कन्टेनरमा मानव अंगहरू, रगतजन्य तन्तु, सालनाल आदि सङ्कलन गरी छुट्टै ट्रलीबाट फोहर सङ्कलन गर्ने स्थलसम्म पुर्याइन्छ। सालनाललाई प्लेसेन्टा पिटमा राखिने गरिएको छ। निलो कन्टेनरमा स्लाईनका बोतलहरू, पानीका बोतलहरू, सिसा तथा प्लास्टिक पदार्थहरू सङ्कलन गरी ठेकेदारलाई बेच्ने गरिएको छ। हरियो कन्टेनरमा खेर गएको खानेकुरा, फलफूलका बोक्रा तथा अन्य सड्ने पदार्थहरू सङ्कलन गरिन्छ जसलाई कम्पोष्ट पिटमा राखी जैविक मलमा परिणत गरिन्छ र उक्त मललाई बगैचामा प्रयोग गरिन्छ। यस अस्पतालमा मृत शरीर राख्नको लागि शव गृह रहेको छ जसमा मृत शरीर राख्ने फ्रिजर बक्सको व्यवस्था पनि गरिएको छ। यसका अतिरिक्त तल दिइएका न्यूनीकरणका उपायहरू अवलम्बन गरिने छन्।

- कलर कोडिङ सिस्टम मार्फत फोहरको वर्गीकरण गरिनेछ।
- फोहरमैला व्यवस्थापनलाई सहज बनाउन फोहरलाई पुनः प्रयोग गर्न मिल्ने र पुनः प्रयोग गर्न नमिल्ने फोहरलाई छुट्टाछुट्टै कन्टेनरमा सङ्कलन गरी सम्बन्धित ठाउँमा पुर्याइने छ।
- संक्रमित फोहरलाई इन्सिनेरेटरको सहायताले नष्ट गरिनेछ।
- संक्रमित फोहरलाई अटोक्लेभिङ्ग मार्फत संक्रमण रहित गरिनेछ।
- सिरिन्जको व्यवस्थापनको लागि निडिल डिस्ट्रवायर प्रयोग गरिनेछ।
- प्लेसेन्टा व्यवस्थापनको लागि प्लेसेन्टा पिटको प्रयोग गरिनेछ।
- फोहोर पानी प्रशोधनको लागि फोहोर पानी प्रशोधन संरचना निर्माण गरिनेछ।
- ध्वनि प्रदूषणको प्रभाव कम गर्न साईलेन्ट जेनेरेटरको प्रयोग गरिनेछ भने आवाज आउने जेनेरेटरको लागि बन्द कोठाको प्रयोग गरिनेछ।
- पानीको नियमित आपूर्ति र सुनिश्चित गर्न सम्बन्धित निकायसँग समन्वय गरिनेछ।
- आकाशे पानी सङ्कलन प्रविधिको प्रयोग गरिनेछ।
- सम्भावित आगलागिको नियन्त्रणका लागि रिर्जभ ट्याङ्कीको व्यवस्था गरिनेछ।
- उचित पार्किङ्ग स्थलको निर्माण गरी सवारी साधनहरूको चाप कम गरिनेछ।
- अस्पताल भवनमा अपाङ्ग मैत्री संरचना निर्माण गरिनेछ।
- मर्करी रहित वातावरण निर्माण गरिनेछ।

भौतिक तथा रासायनिक वातावरणको नकारात्मक प्रभावहरू न्यूनीकरण तथा निराकरणका उपायहरूको लागि ने.रु. १७,००,००० (सत्र लाख) बजेट प्रस्ताव गरिएको छ।

जैविक वातावरण

अस्पताल क्षेत्र भित्र बगैचा निर्माण गरी हरियाली कायम गरिनेछ। जैविक वातावरणमा पर्ने नकारात्मक प्रभावहरू न्यूनीकरणको लागि ने.रु. २,००,००० (दुई लाख) प्रस्ताव गरिएको छ।

सामाजिक-आर्थिक तथा साँस्कृतिक वातावरण

- पेसागत स्वास्थ्य तथा सुरक्षाका उपकरणहरू प्रयोग गरिनेछ ।
- पिउने पानीको लागि प्रशोधन गरेर मात्र प्रयोग गरिनेछ ।
- व्यवसायिक जोखिम तथा दुर्घटना नियन्त्रण गर्न आकस्मिक पूर्व तयारीका योजना लागू गरिनेछ ।
- गुनासो सुनुवाईको लागि गुनासो सम्बोधन एकाई गठन गरिनेछ ।
- स्थानीय जनताहरूसँग समन्वय गरी समाजमा आईपर्ने द्वन्द्वको समाधान गरिनेछ ।
- सवारी साधनको दुर्घटना न्यूनीकरण गर्न जोखिमयुक्त ठाउँहरूमा ट्राफिक चिन्हहरूको व्यवस्था गरिनेछ ।
- अस्पताल क्षेत्र सफा राखिनेछ ।

सामाजिक-आर्थिक तथा साँस्कृतिक वातावरणमा पर्ने नकारात्मक प्रभावहरू न्यूनीकरणको लागि ने.रु. ७,००,००० (सात लाख) बजेट प्रस्ताव गरिएको छ।

वातावरणीय व्यवस्थापन योजना

वातावरणीय संरक्षणका उपायहरू आयोजनाको सञ्चालन अवधिमा लागू गरिनेछ। वातावरणीय न्यूनीकरणका उपायहरूको अवलम्बन गर्नु प्रस्तावकको दायित्व भित्र पर्दछन्। वातावरणीय व्यवस्थापन योजना कार्यान्वयन गर्नका निमित्त आयोजना प्रतिबद्ध रहेको छ यसको निमित्त छुट्टै वातावरणीय व्यवस्थापन एकाई स्थापना गरी वातावरणीय व्यवस्थापन योजना अनुरूप काम भए नभएको निरीक्षण गर्नुका साथै तथ्याङ्क पनि सङ्कलन गरिनेछ।

वातावरणीय अनुगमन योजना

प्रस्तावकले प्रस्तावको सञ्चालन गर्ने चरणमा सोबाट वातावरणमा परेको प्रभावको विषयमा प्रत्येक छ महिनामा स्व:अनुगमन गरी सोको प्रतिवेदन सम्बन्धित निकाय वा विभागमा पेश गर्नेछ। वातावरणीय अनुगमनको लागि वन तथा वातावरण मन्त्रालय, स्वास्थ्य तथा जनसंख्या मन्त्रालय तथा वातावरण विभागसँग समन्वय गरिनेछ। वातावरणीय अनुगमनको लागि वार्षिक जम्मा ने.रु. ४,००,०००/- प्रस्ताव गरिएको छ।

वातावरणीय परीक्षण:

वन तथा वातावरण मन्त्रालय वा तोकिएको निकायले प्रस्तावको कार्यान्वयन सुरु गरी सेवा वितरण सुरु गरेको दुई वर्ष भुक्तान भएको मितिले छ महिना भित्र वातावरणीय परीक्षण कार्य गर्नेछ। प्रस्तावकले आफैले पनि आन्तरिक वातावरणीय परीक्षण गर्नेछ जसको लागि ने.रु. ६००,०००/- प्रस्ताव गरिएको छ।

निष्कर्ष

युनाईटेड मिशन अस्पताल तानसेन स्तरोन्नतिबाट स्थानीय तथा क्षेत्रिय स्तरमा सकारात्मक प्रभाव पर्ने देखिन्छ। यस अस्पतालको स्तरोन्नतिबाट पर्ने सकारात्मक प्रभावहरु अन्तर्गत स्थानीय स्तरमा सर्वसुलभ स्वास्थ्य सेवामा पहुँच, रोजगारीको अवसर, सामाजिक उत्तरदायित्व कार्यक्रम मार्फत स्थानीय बासिन्दाहरु लाभान्वित, स्थानीय सरकारको राजश्वमा वृद्धि आदि रहेका छन्। यस आयोजनाको स्तरोन्नतिले वातावरणमा केही नकारात्मक प्रभावहरु पर्ने देखिन्छ तर ती प्रभावहरुलाई विभिन्न न्यूनीकरणका उपायहरुबाट कम गर्न सकिन्छ। यस अध्ययनले प्रस्ताव गरेका न्यूनीकरणका उपायहरु, वातावरणीय व्यवस्थापन योजना र वातावरणीय अनुगमन योजना अवलम्बन गर्न प्रस्तावक प्रतिबद्ध रहेको छ।

Executive Summary

Proponent

The proponent of United Mission Hospital Tansen project is United Mission to Nepal Medical and Development Trust. The detail address of the proponent is given below;

Address of proponent

United Mission to Nepal Medical and Development Trust

Address: Kathmandu Metropolitan City-11, Thapathali, Kathmandu

Phone No: +977 -1-4228118

Email: umnmdt@umn.org.np

Fax: +977 – 1-4225559

Introduction of the project

United Mission Hospital Tansen is located at Tansen Municipality, Ward no. 1 of Palpa district. Currently the hospital is in operation phase having 169 bed capacities and the proponent is proposed to upgrade bed capacity from 169 bed to 200 beds. The hospital is operated by United Mission to Nepal Hospital, Kathmandu. The PAN No. of the hospital is 601537453. The hospital has been operating with services like OPD (General medicine, general surgery, Anesthesiology, Obstetrics and Gynecology, pediatrics with Neonatology, Dental Surgery, Dermatology with Venereology) and IPD (Laboratory, X-ray, ECG, operation theatre, endoscopy, pathology etc.) and 24 hour emergency services and pharmacy. The occupancy rate of the hospital is 83.12%. The total area occupied by the hospital is 13,575.33 sq. m. where two buildings of hospital have been constructed. The hospital building has earthquake resistant and all the emergency structures has constructed. Besides this, the land area has been allocated for open space (2,715.067 m²), garden area (2,036.29 m²) and parking area (3,393.83 m²). About 188 human resources are working in the hospital. About 50,000 liters of water is required per day for operation of 169 bed of hospital and 605.3 kg/day health care waste is generated during full occupancy of 169 beds and with upgrading of the hospital from 169 to 200 beds, 721.3 kg of health care waste will be generated per day and 70,000 ltrs. water will be required per day.

Rationality for EIA Study:

According to Environment Protection Rules, 2077, Schedule-3 (B) Health Sector, for the operation of hospital, nursing home, teaching hospital exceeding their capacity more than 100 beds should conduct Environmental Impact assessment study and approve Environmental Impact Assessment report from concerned agency. As United Mission Hospital Tansen is proposed to upgrade its capacity from 169 beds to 200 beds hospital, so Environmental Impact Assessment study has conducted. The Scoping and Terms of Reference of EIA report were approved by Ministry of Forests and Environment on 2078/01/12.

Environmental Impact Assessment (EIA) of United Mission Hospital Tansen

Study Methodology

The Environmental Impact Assessment (EIA) report of this project is prepared according to the Environment protection Act, 2076 and Environment Protection Rules, 2077. During EIA study, desk study and field study were conducted. In desk study engineering drawing, soil test report, topo map and other published documents related to this project were studied. Similarly, checklist/questionnaire was developed during desk study. Beside this, field study and inspection, collection of baseline data, Key Informant Interview etc. were conducted. The study team has visited the field from 2087/04/29 to 2078/05/02 Public hearing program was conducted in the project-affected area on 2078/04/30. The raised issues during the public hearing were incorporated in this report. The collected data then analyzed/evaluated according to the National EIA Guidelines, 1993 and environmental mitigation and enhancement measures have been suggested accordingly.

Review of legal Documents

The main reviewed legal documents during the preparation of the Environmental Impact Assessment (EIA) of this project are Environment Protection Act 2076, Environment Protection Rules 2077, National EIA Guidelines 2050, National Health Policy 2076, Health Care Waste Management Guideline 2014, Health Institution Establishment, Operation and Upgradation Standards, 2070, Solid Waste Management Act, 2068, Solid Waste Management Rules, 2070, Labour Act, 2074, Local Government Operation Act, 2074, Public Health Service Act, 2075, Public Health Service Regulations, 2077 etc. Besides this the relevant international convention were also reviewed.

Existing Environmental Condition:

Physical Environment:

Geographically, Palpa district lies in the hilly region of the Nepal. The total area of Palpa district is 1373 Sq. km whereas total area of the Tansen Municipality is 109.80 Sq. km. United Mission Hospital is located at Ward number 1 of the Tansen municipality. The geographical coordinate of the hospital site is 27⁰ 40' 20'' N latitude and 85⁰ 26' 35'' E longitudes. The project area has sub-tropical type of climate. The average maximum temperature of this area is 35.05⁰C and the average minimum temperature is 8.55⁰C. The hospital site is located at an elevation of 1350 m from mean average sea level.

Biological Environment

The hospital site does not contain any endemic or endangered floral species in its territory; however many tree species have been planted all around hospital premises. The tree species existing in the surroundings area are Mango (*Magnifera indica*), Chilaune (*Schima walichii*), Avagadro (*Persea Americana*), Bamboo (*Bambusoideae*), Dhupi (*Juniperus sps*), Salla (*Pinus roxbourgii*), Walnut (*Juglans sps*) etc. The common bird species found around the project site are *Acridotheres tristis* (common Myna), *Passees domesticus* (house sparrow), *Corvus spledens* (Crow), *Columbidae* (Dove) etc.

Socio-economic and Cultural Environment:

According to the National Population and Housing Census 2011, the total households of the Tansen Municipality is 8,411 and total population is 29,095 (female 15,353 and male 13,742). The total population of the ward number 01 of Tansen Municipality is 6,451 (female 3,376 and male 3,075) and total household is 1,916.

According to CBS 2011, the major ethnic groups in the Tansen Municipality are Brahman Hill (26.12%), Chhetree (16.28%), Magar (29.25 %), Newar (10.83 %) Kami (5.58 %), Thakuri (1.12 %), Sarki (2.05%), Gurung (0.51%) and other (8.26%) Similarly, the most of the people follow Hinduism as a religion. 80.00% of the total population follow Hinduism, 12.89% of population follow Buddhist, 5.25% of population follow Christian, 1.23% of population follow Muslim and remaining 0.64% of population follow other religions.

Environmental Impacts

Beneficial impacts

The main beneficial impacts during the project operation phase are as follow;

- Increase in economic and commercial activities around the hospital area
- Access on easy and quality health services
- Employment opportunity to local people
- Availability of free health services to the poor and helpless people
- Support to the community through corporate social responsibility activities
- Conduction of free health checkup camp
- Conduction of training related to health
- Local development

Adverse impacts

Physical Environment

The adverse impacts during operation phase are;

- Impact due to health care waste generation
- Impact due to solid waste generation
- Impact due to liquid waste generation
- Air and noise pollution
- Impact due to air and noise pollution due to diesel generator
- Impact due to radiation hazards
- Impact due to use of chemicals
- Impact due to ground water pollution
- Impact due to Natural hazards
- Impact due to traffic congestion and parking
- Impact due to fire hazard

Biological Environment:

The hospital building is already constructed in the private land so no trees are cut down from the project area. The key challenge during the operation of the project is in maintaining and protecting the greenery around hospital.

Socio-economic and Cultural Environment:

The adverse impacts during operation phase are;

- Impact due to lack of sanitation in the hospital
- Impact due to lack of pure drinking water
- Food safety and hygiene
- Challenges in Grievance redress mechanism
- Disable friendly structures
- Challenges in hospital services management

Alternative Analysis

The alternative analysis includes alternatives of location, design, technology, time schedule and operational procedures, environmental management system, risk analysis and no project alternative. Currently the project is in operation and planned for upgrading so alternative of location is not considered. Other alternatives such as design, alternative technology, time schedule and operational procedures, risk analysis and no project alternative have been duly analyzed. The alternatives adopted for this project seem to be the best alternatives in terms of technological, economic and environmental perspectives for current situation.

Environmental Impact enhancement and mitigation measures

Beneficial impacts enhancement measures

Following enhancement measures will be adopted during operation of the project;

- Employment opportunity will be given to the local people according to their skill
- Technical skill be enhanced
- Health related training will be conducted
- Quick and better health services will be provided
- Free health checkup camp will be conducted
- Corporate social responsibility activities will be conducted
- Free health service will be provided to poor, helpless people

An amount of NRs. 16, 00,000 is allocated for beneficial impact enhancement measures. Apart from this, the corporate social responsibility program will be conducted in consultation with the concerned bodies in accordance with the prevailing law.

Adverse Impacts Mitigation Measures

Physical Environment and Chemical Environment

Healthcare waste and infectious waste generated from each wards of the hospital has been managed by doing source segregation of the waste in colour coded bin. Red colour bin has been used for the collection of human organ, tissues and placenta and transported by separate trolley to the waste collection centre. Placenta has kept in placenta pit. Remaining infectious waste has been disinfected by using autoclave. Blue color bin has been used for saline bottle, waste bottle and plastic materials which are collected and sold to vendor.

Environmental Impact Assessment (EIA) of United Mission Hospital Tansen

Green colour bin has been used for the collection of remaining food, fruits and other degradable waste which has been kept in to compost pits and used as green manure. The manure has been used in the garden. The dead body has been kept in the mortuary room where dead body freezer box is used. Beside this following mitigation measures will be applied during operation phase;

- Waste will be segregated by using color coded dust bin
- Reuse of waste being generated and prior segregation of the wastes that needs to be disposed.
- Infectious waste will be disinfected by using autoclaving
- Placenta pit will be used for placenta management
- Waste water treatment plant will be used for the waste water management
- Silent Generator will be used and operated in closed room
- Rain water harvesting system will be used for storm water management
- Open space will be allocated for the infiltration of water to recharge ground water
- Water will be stored for the possible emergency fire frightening
- Sufficient parking area will be allocated for management of traffic
- Hospital building will be constructed as disable friendly
- Mercury free environment will be created within hospital

The project has proposed NRs. 17,00,000/- (Seventeen lakh) for the adverse impact of physical and chemical environment mitigation measures.

Biological Environment:

Greenery will be maintained by developing the garden within the hospital area. The proponent has allocated NRs. 2, 00,000 (Two Lakh) to mitigate the adverse impact on biological environment.

Socio-economic and Cultural Environment

- Occupational health and safety equipments will be used
- Drinking water will be used after treatment
- Emergency preparedness plan will be prepared to prevent occupational diseases and accidents
- Grievance redress mechanism will be established
- Disputes will be settled by coordination with local people
- Traffic accident will be minimized by providing traffic sign at risk zone area
- Hospital area will be maintained clean

An amount of NRs. 7, 00,000 (Seven lakh) is allocated for socio-economic and cultural environmental impact mitigation measures.

Environmental Management Plan

Environmental management plan will be prepared for implementation of beneficial impact enhancement measures and adverse impact mitigation measures. Environmental management plan will be implemented during operation phase. The proponent is committed

Environmental Impact Assessment (EIA) of United Mission Hospital Tansen

for implementation of environmental management plan and for this environmental management unit will be established.

Environmental Monitoring Plan

The proponent will conduct self monitoring of proposal at every 6 month during operation phase to identify the impact on environment and report will be submitted to concerned agency and department. The project will coordinate with Ministry of Forests and Environment, Ministry of Health and Population and Department of Environment for environmental monitoring. An amount of NRs. 4, 00, 000 is proposed for environmental monitoring annually.

Environmental Auditing Plan

Ministry of Forests and Environment or prescribed body will conduct environmental auditing within 6 months after completion of 2 years of the commencement of service. Proponent will conduct self environmental auditing in which an amount of NRs. 600,000 is allocated.

Conclusion

The Upgrading of United Mission Hospital Tansen will have beneficial impacts in local and regional level. The upgrading of this hospital has a number of beneficial impacts such as access on health service, job opportunity, increase in local economy, free health checkup for poor and helpless people etc. The upgrading of this project will have few adverse impacts which will be mitigated by implementing different mitigation measures. The proponent is committed to implement mitigation measures, environmental management plan and environmental monitoring plan proposed by this study.

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Abbreviation and Acronyms

AAC	Augmentative and alternative communication
ANM	Auxiliary Nurse Midwifery
CBS	Central Bureau of Statistics
CSSD	Central Sterile Services Department
CMA	Community Medical Assistance
CCU	Critical Care Unit
CSR	Corporate Social Responsibility
DHM	Department of Hydrology and Meteorology
DMS	Department of Medical Store
DRO	Department of Radiation Oncology
Edu.	Education
EIA	Environmental Impact Assessment
EPA	Environment Protection Act, 1997
EPR	Environment Protection Rules, 1997
EMP	Environmental Management Plan
ENT	Ear Nose Throat
ESO	Electric Spinal Orthotics
GoN	Government of Nepal
HCT	Hematopoietic Cell Transplantation
HDU	High Dependency Unit
HIV	Human Immunodeficiency Virus
ICU	Intensive Care Unit
IHR	International Health Regulation
IT	Information Technology
Ltd.	Limited
M ²	Square Meter
MoHP	Ministry of Health and Population
MoFE	Ministry of Forests and Environment
NCD	Non-Communicable Diseases
NHP	National Health Policy
NICU	Neonatal Intensive Care Unit
OPD	Out Patient Department

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OT	Operation Theater
PICU	Pulmonary Intensive Care Unit
PoP	Persistent organic Pollutants
Pvt.	Private
SBA	Skilled Birth Attendants
SDG	Sustainable Development Goals
SLTHP	Second Long Term Health Policy
SAICM	Strategic Approach to International Chemicals Management
SPL	Sound Pressure Level
TB	Tuberculosis
ToR	Terms of Reference
UHC	Universal Health Coverage
UMHT	United Mission Hospital Tansen
WHO	World Health Organization

Chapter 1 : Name and Address of the Individual or Institution Preparing the Report

1.1 Name and Address of the Proponent

The name and address of the proponent is given below:

United Mission to Nepal Medical and Development Trust

Address: Kathmandu Metropolitan City-11, Thapathali, Kathmandu

Phone No: +977 – 1-4228118

Email: umnmdt@umn.org.np

Fax: +977 – 1-4225559

1.2 Consultancy Responsible for Preparing Report

United Mission Hospital Tansen has entrusted Green Globe International Pvt. Ltd. for the study and preparation of the report. GGI having its main office in Koteshwor, Kathmandu was established in 2015 to deliver various kinds of consultation services and expertise in environment sectors.

Name and Address of the Consultant

Green Globe International Pvt. Ltd.

Koteshwor-32, Kathmandu, Nepal

Phone No.: 01-5149111

Email: info.greenglobes@gmail.com

1.3 Rationality for EIA study

The conduction of EIA is a legal requirement as per the GoN provision in Environment Protection Act (EPA), 2076 and schedule-3 (Section “Kha”), Health sector of the Environment Protection Rules, 2077 every hospital exceeding their capacity more than 100 beds should perform Environmental Impact assessment (EIA) study and should approve from concerned Ministry. According to schedule-3 “ज”(१) of Environment Protection Rules, 2077, there is a provision to conduct Environmental Impact Assessment for the construction and operation of a building that will have more than 45 m height and also according to EPR 2077, Schedule 3 "ज" (६) there is a provision to conduct Environmental Impact Assessment for the construction and operation of a building that will use more than 20,000 liters of groundwater daily as the United Mission Hospital Tansen is planning to upgrade 200 beds from 169 beds in buildings having less than 45m height in an area 13,575.33 m². But will not use groundwater. So that by beds aspects, EIA study has conducted.

1.4 Objectives of EIA

The main objectives of the EIA study are;

- To collect baseline data related with physical, biological, socio-economic and cultural environment.
- To identify, predict and evaluate the potential project impacts on the local environment.

Environmental Impact Assessment (EIA) of United Mission Hospital Tansen

- To identify and recommend benefits augmentation and mitigation measures.
- To provide environmental management and monitoring plan.
- To provide information for decision makers about the environmental implications of the proposed project and associate cost for benefits augmentation and adverse impact mitigation.

1.5 Scope of the Study

The scope of this study is to identify the possible impact due to upgradation of United Mission Hospital Tansen on the local physical, biological, socio-economic and cultural environment of the project area and to provide mitigation measures to minimize such impacts. Apart from this, the environmental and social effects of other causes in the area have not been included in this study.

1.6 Relevancy of the Study

United Mission Hospital Tansen is a major health care center for the people of Palpa district. During the operation phase of hospital, this hospital has been providing health services through specialized doctor's with new technologies and modern equipment. This hospital offers tertiary/referral level multi-specialty services which are a common institution for critical care patients of the Palpa District. The hospital is situated at the Tansen Municipality-1, Palpa i.e. Bhusaldanda so that people can easily get health services. This hospital will play crucial role in future of health sector development in Nepal so that this hospital project is most relevant.

Chapter 2 : Project Description

2.1 Background

Dr. Robert Flemming (author of “Birds of Nepal”), his Physician wife Dr. Bethel Flemming and their family and Dr Carl Friedericks and his family were come to visit Tansen in the 1951-1952. During their visit to Tansen they examined and treated patients and even performed a bladder stone operation. After that, the local people of Tansen invited them to come back and establish a hospital and by 1954 permission was given for the newly formed United Mission to Nepal to start health work in the Kathmandu valley and Tansen. At First, Dr Carl Friedericks opened a clinic in rented accommodation in the Tansen Bazar as the work grew land was granted in the Bhusaldanda area just east of the Tansen Bazar to build a hospital. In 1959, the Hospital was officially opened in the first building of the hospital with goal of providing quality healthcare services as well as specialized healthcare services with affordable fee and also hospital has been providing such type of health services in the whole Palpa district since its establishment.

Tansen hospital was established in 1954, when the United Mission was permitted to start work in Nepal. Tansen hospital was the first place where medical care was given, until then Nepalese people had to went India for their medical care. At present, the hospital has 169 beds, staffed with 257 medical and 159 supporting staff. Nearly 500 outpatient visits the hospital daily. The hospital has been dedicated to health care service for more than decades. The hospital is renowned for the quality care since its beginning and recently has been making the services more qualitative and international standard by investing on technology and infrastructure. The hospital has been providing quality health care services since its establishment.

United Mission Hospital, Tansen (UMHT) is an acute care general hospital situated in Tansen, Palpa District. UMHT is a referral hospital for Palpa and surrounding districts. The Mission of the Hospital is to promote health, prevent illness and treat disease among the people of Palpa and surrounding districts, by providing high-quality health care at the level of a zonal hospital in the Name and Spirit of Jesus Christ, irrespective of colour, caste, creed, gender or financial status and to make him known in word and deed. The United Mission Hospital, Tansen is committed to helping its staff to develop their full potential. UMHT is also a training hospital with a clear mission to train up medical nursing and paramedical professionals both for the immediate needs of the Hospital and for wider service in Nepal.

Tansen hospital was awarded the title "Best Hospital Nepal" in 2012, is fully non-governmental and is part of the activities run by UMN in Nepal. As a matter of fact, the government has requested UMN to continue its role and involvement, instead of handing it over to the state, as proposed by UMN. In 2015, a new agreement for the next five years was signed with the Government of Nepal. The vision is to grow the capacity of the hospital to 250 beds over a 5-year period as, at this point; patients still need to be turned

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away when all the spaces on the floor have been filled. The hospital is almost 60s years old, at the time of hospital establishment there was not provision made by government to conduct EIA therefore the hospital did not conduct the EIA study. Now the hospital need to renew from concerned Ministry so that Environmental Impact Assessment (EIA) report is required.

Currently the hospital is running with 169 beds providing various health services. For continuity of the hospital in future, United Mission Hospital Tansen is planning to upgrade 169 beds to 200 beds. The total land area of the hospital is 13,575.33 m². Sufficient area is available for allocation of parking area and greenery. The United Mission Hospital Tansen is operated by United Mission to Nepal Medical and Development Trust, which is operated by international donor, so this EIA report is written in English language.

2.2 Project Description

2.2.1 Project Location and Accessibility

United Mission Hospital Tansen is located at ward no.1 of Tansen Municipality. The project site is situated at an altitude 1350 m from sea level. Palpa district lies in the hills of western Nepal in Lumbini province at an altitude from 250 m to 2000 m. The municipality is located on the way between Butwal and Pokhara highway, on the crest of the Mahabharat range or Lesser Himalaya overlooking the valley of the Kaligandaki River to the north. The United Mission Hospital Tansen (UMHT) is located at Bhusaldanda, 1 km up the "Mission road" from the Tansen bazaar.

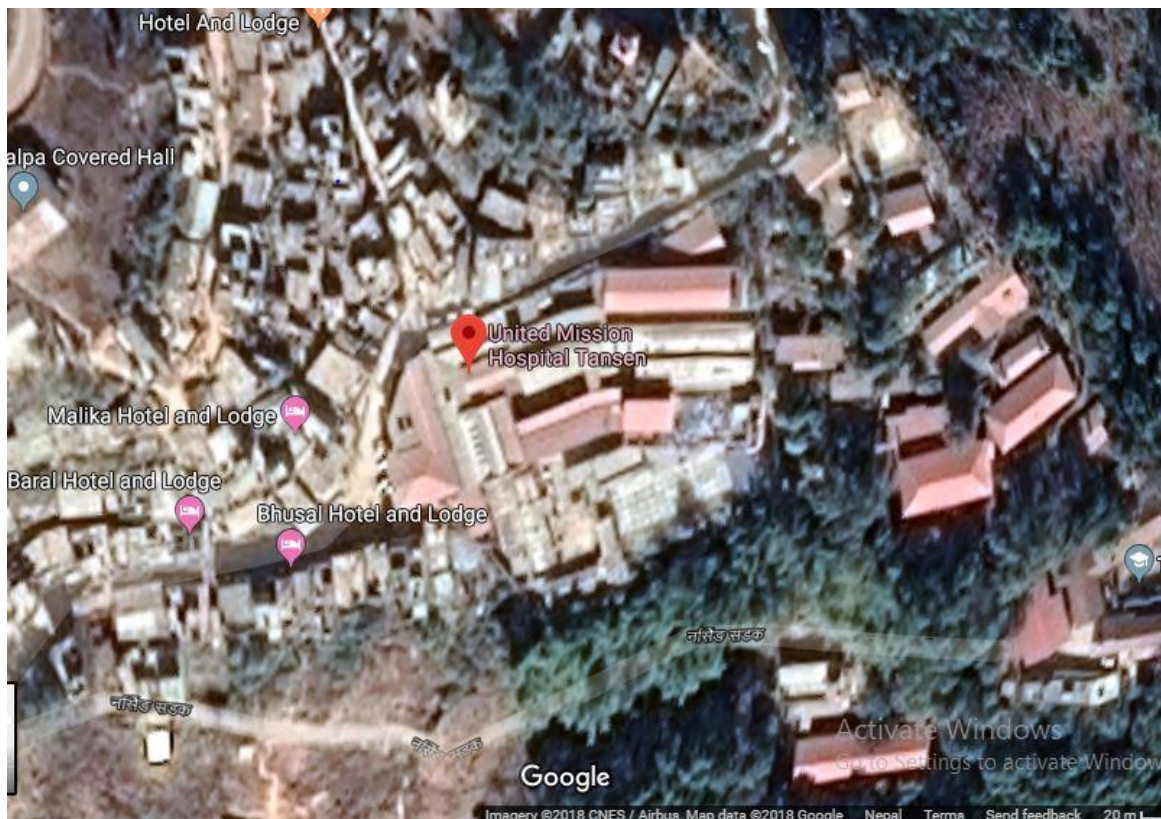


Figure 2-1: Location map of United Mission Hospital Tansen (Source: Google map)

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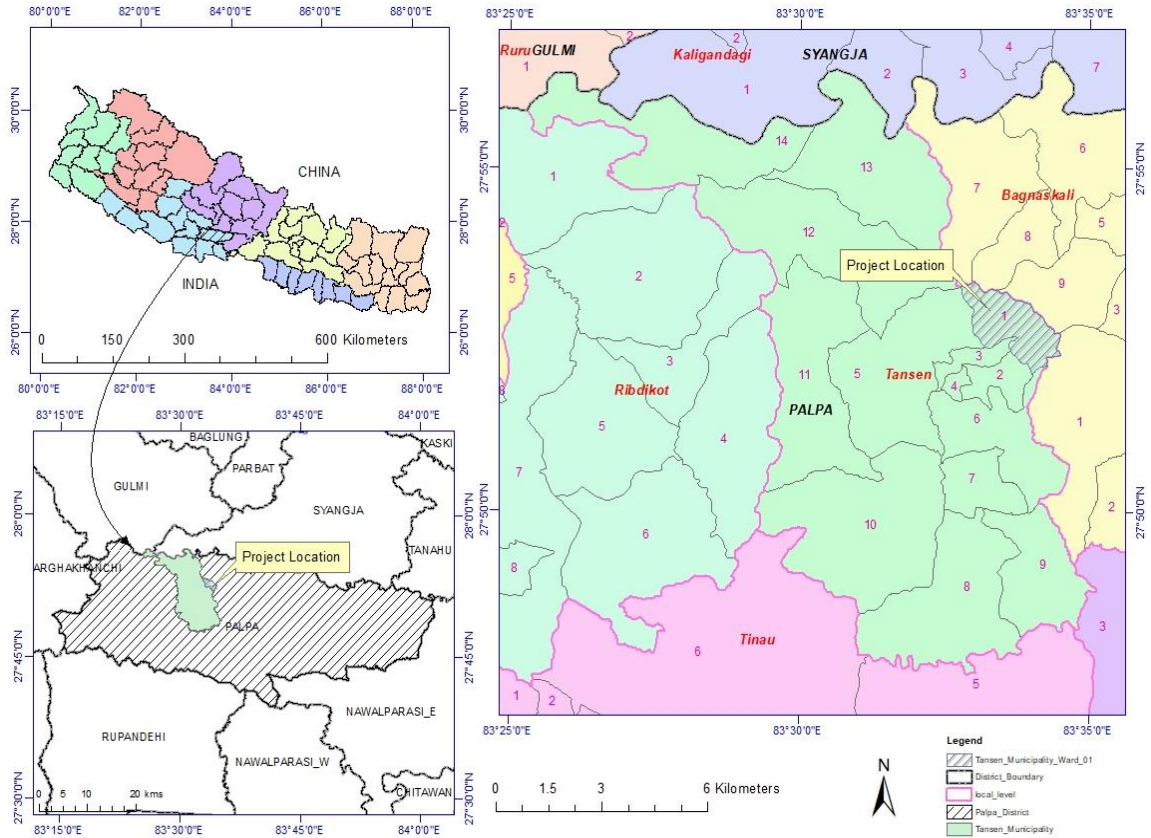


Figure 2-2: Location of United Mission Hospital Tansen (Source: GIS Map)

2.2.2 Salient Features

The salient features of the project are as follows:

Table 2-1: Salient features of the project

Features	Specification	Remarks
Project Name	United Mission Hospital Tansen	
Project Location		
Province	Lumbini	
District	Palpa	
Municipality	Tansen Municipality	
Ward No.	1	
Latitude:	27° 40' 20'' N	
Longitude:	85° 26' 35'' E	
Altitude	1350 m	
Legal Aspects of Hospital	PAN No: 601537453	
No. of Beds	169 beds (Running), 200 beds (proposed)	
<ul style="list-style-type: none"> • Total Outdoor Patient visit in a year • Total indoor Patient visit in a year • Outdoor Patients/Day (currently) • Indoor Patients/Day 	<p>113,000</p> <p>25,100</p> <p>500</p> <p>40 (newly admit patient in a day)</p>	

Environmental Impact Assessment (EIA) of United Mission Hospital Tansen

<ul style="list-style-type: none"> • Bed Occupancy 	83 %	
<p>Health Services provided by Hospital</p>	<p>A)Basic Health Services as per Schedule 1 of Public Health Service Regulation ,2077</p> <p>1)<u>Immunization service</u></p> <p>a) Immunization services for children</p> <p>b) Vaccination for pregnant women and women of reproductive age</p> <p>2) <u>Integrated management of newborn and childhood illnesses; nutrition services; pregnancy, labour and delivery services; maternal, newborn and children health services, such as family planning, abortion and reproductive health services:</u></p> <p>a) Management of newborn and childhood illnesses</p> <p>b)Nutrition services</p> <p>c)Pregnancy, labour and delivery services</p> <p>d) Family planning, abortion, reproductive health services and women's cancer services</p> <p>3)Services related to infectious diseases:</p> <p>4) Services related to non-communicable diseases and physical distortions</p> <p>5)Mental illness services</p> <p>6) Geriatric health services</p> <p>7) General emergency services</p> <p>8)Promotional health services</p> <p>9) Ayurveda and other traditional health services:</p>	
	<p>B) Following Treatment services</p> <p>i) General Physician Services</p> <p>ii) General Surgery Services</p> <p>iii) Gynecology and Obstetrics</p> <p>iv)Child Diseases and Newborn Services</p> <p>v)Dental Services</p> <p>vi) Orthopedic Services</p> <p>vii)ENT Services</p> <p>viii)Psychiatric Services</p> <p>ix) Dermatology and Venereology</p> <p>x) Ophthalmology Services</p> <p>xi)Physiotherapy Services</p> <p>xii) Anesthesiology Services</p>	
	<p>C) Following diagnostic and other services</p> <p>i) Radio Imaging Services</p>	

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	ii) Laboratory Services (Including Histo- cytopathology)	
	D) Following 24-hour services i) Emergency services with Operation Services ii) Emergency Pathology iii) Radio Imaging Services iv) Blood Transfusion Services v) Pharmacy Services	
	E) Following intensive care services: i) HDU ii) ICU, Neonatal ICU (NICU), Pediatric ICU (PICU)	
	F. Pharmacy Services	
	G. Following other services: i) Social Security Unit, one-stop Crisis Management Centre, Dietetics and Nutrition ii) Haemodialysis Services iii) Medio-legal and Forensic Services	
	H. Other services prescribed by the Ministry from time to time	
Total area required for 200 beds	11000 m ² (Enough land area is available for operation of 200 beds)	
Total Land area	13,575.33 m ²	
Open space	2,715.067 m ² (20 % of Total land Area)	
Greenery Area	2,036.29 m ² (15 % of Total land Area)	
Parking area	3393.83 m ² (25% of Total land Area)	
Total Floor Area	5430.132 m ² (40 % Total land Area)	
FAR	1.5 (Permissible) 0.4 (Actual)	
Setback	3 m	
Hospital Block (Building No 1)		Lower Ground: Watchman office Underground Parking, Mortuary, Oxygen for Emergency , Store goods entrance, Community health office, Store office, Oxygen store, ASO store, Maintenance office, Biomedical workshop Ground Level:

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		<p>Orthopedic ward, Post operation ward , Critical ward, 2 semi private rooms and 6 bed burn unit, Laundry, Female changing room, Chapel /prayer room</p> <p>Medical Ward : including 4 general patients beds(one TB isolation area) one critical bay, 2 isolation rooms, 4 rehab unit, 4 bedded high dependency unit, nursing station(on ramp small x-ray store)</p> <p>Upper ground Level :</p> <p>Pediatric ward: including dressing room, incubator room, 2 isolation rooms, one critical bay, 3 general bays, one children’s burns room, nursing station, playroom and one semi private room, one.(above this laundry area on roof</p> <p>Surgical Ward: Male surgical, female/ Gynecology, 3 smaller ward rooms, one critical/ post – op room, nursing station \</p> <p>OR suite: male and female changing rooms, recovery ward, Doctor’s office, 3 major operating rooms, wash room and prep rooms, (small rest room upstairs)</p> <p>Central sterile Supplies Department: Large prep room, small instrument washing room, autoclave room with 3 autoclaves</p> <p>Ultrasound room and waiting area, echo(2 small room, Blood bank room, lower lab/ receiving station, Inpatient/ outpatients</p>
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		<p>cashiers (cashiers office) Minor Operating room: waiting area, recovery, 2 operating rooms, store</p> <p>Dressing and plaster room, Orthopedic surgical consult room X-ray: x-ray rooms, Processing room and office Male OPD: waiting area and two large and four small consulting rooms, waiting area and clerical station.</p> <p>Female OPD: One Antenatal room, one family planning room, seven consulting rooms waiting area and clerical station.</p> <p>Pediatric OPD: 4 consulting rooms, aiding area and clerical station. Large OPD waiting hall, 3 registration windows and records office.</p> <p>Emergency ward: 10 large areas for 10 + patients, procedure room, patient counseling room/ office.</p>
	<p align="center">First floor (Administration Department)</p>	<p>Offices: NS, MS, personnel office, bookkeeping and purchasing office, internal auditor and manager of accounts rooms, Medical records officer office, IT office, server room and IT workshop room. Hospital administrator office, Hospital Director office, IMIS clerks station, Secretaries and mailroom.</p> <p>Lower ground floor (OPD): large waiting</p>

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		<p>area: Pharmacy and pharmacy office, endoscopy room and waiting area, Physiotherapy (3 rooms) Neuro rehab room, occupational therapy. HIV/ART clinic, Surgical consult clinic, TB clinic, Treadmill test room. OPD supervisor's office.</p> <p>Dental department: main room (3 dental chairs,) autoclave room, prostodontics room, x-ray room and office. Pastoral care/social services: office, 2 counseling rooms, Psychiatry clinic /counseling room. Children's ward teacher office and toy store.</p>
<p>Maternity Building</p>		<p>Ground floor: Maternity ward (ante and post natal), nursing station, incubator, neonate room, admission bay, 4 delivery rooms, one cabin, nursing supervisor office and single room (USG)</p> <p>First floor: Large meeting hall/training room, small conference room, Surgeons office, RIPE/training office, staff association room, Library with quiet study room and nurse educator office.</p> <p>Second floor: main laboratory, Hematology, biochemistry, microbiology, Histopathology rooms, preparation and wash area, on call room, lab office, class/ teaching area.</p>
<p>Compound</p>		<p>Staffs quarters and guesthouse, incinerator and waste management.</p>

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Carl and Betty-Ann Friedericks building		Upper ground floor training hostel, first floor quarters, lower ground floor, SBA classroom and office, MLP classroom, demonstration room.
Building No 2		Canteen and on call rooms, patients deras, and motorcycle parking.
Building No 3		Oxygen plant near tennis court
Generator House		
Lift	No	
Ramp	Yes	From Ground Floor all the way up to the top floor.
Wheelchair/Trolleys/Stretches	More than 50 nos.	At every entrance portico
Toilets for disabled	25	Chair toilets/Wooden/Plastic sets
Water Source	spring water, Rain water collection, water is treated with filter Euro guard filter is used to treat the drinking water. • 200 liters water is treated by euroguard filter everyday	
Water consumption/day	50,000 liters per day (169 beds) 70,000 liters per day (200 beds)	
<ul style="list-style-type: none"> • Per bed waste generation in a day • Per staff/OPD patient waste generation in day • Waste generation per day from 169 beds (currently) • Per day waste generation by a 188 staff and 500 outpatient (94+250 Kg) • Total waste generated by hospital per day (Currently) • Waste generation per day (in 200 beds) • Per day waste generated by 283 staffs (after upgrading) • Total waste generated by 500 out patients • Total waste generation after upgrading per day 	<p>1.7 kg</p> <p>0.5 kg</p> <p>287.3 kg</p> <p>344 kg</p> <p>631.3 kg</p> <p>340 kg</p> <p>141.5 kg</p> <p>250 kg</p> <p>340 +141.5+250=731.1 kg</p>	Source : Health Care Waste Management Guideline, 2070 and National Health Care Waste Management Strandard and Operating procedures- 2020
Under Ground Tank capacity	Top tank :127,974 ltrs Old tank : 27,903 ltrs Garden tank : 17,201 ltrs Class Room tank : 228,445 ltrs	

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	<p>Deraline tank : 219,184 ltrs Sagarmatha tank : 369,840 ltrs Metterdaad tank : 198,000 ltrs Tennis Court Tank : 1,005,940 ltrs</p>	
Support to GoN Health Services System	<p>Health Education, Counseling and Social Welfare Desk Unit Vaccination Camp/ DOT Clinic for tuberculosis Awareness Raising (Posters, Pamphlets publication) Free Health Checkup Disaster Preparedness Initiation (Combat with Communicable Disease, Earthquake, Flood and other natural Calamities) & various health day celebration and HIB, ART, Kalazaar, FP, Health insurance Program</p>	
Waste Management Infectious waste Biodegradable waste Plastic waste such as mineral water bottle, saline bottle etc.	<p>Autoclaving/ Composting/bury sharps waste/ Sell to vendor</p>	
Waste Water Management Total waste water generated per day(Currently) Nos. of Septic tank Management Total waste water generated per day after upgrading upto 200 beds	<p>50000 ltr. 4 Stepwise filtration technique in septic Tank/Closed Pit 70000 ltrs Waste water treatment plant will be constructed and same quantity of waste water will be treated after construction of waste water treatment plant.</p>	
Internal Disaster Management Plan	<p>Fire extinguishers are kept in each rooms and floor, emergency exit system, drill practice (training) for workers and security guards</p>	
Corporate Social Responsibility	<p>United Mission Hospital Tansen has been providing primary services through Community Health Centers and various Outreach Clinics in different remote areas of Palpa district. In present financial assistance for poor patients have been provided and discounts facility has been given as per the need of the patients.</p>	

Source: UMHT, 2021

Environmental Impact Assessment (EIA) of United Mission Hospital Tansen

Hospital Services

The Health Services provided by United Mission Hospital Tansen is given in table 2-2.

Table 2-2: Health services of United Mission Hospital Tansen

Hospital Services	
Advanced Imaging and diagnostic Centre	<ul style="list-style-type: none"> • 24 hours radiology services, Portable Ultrasound and Color Doppler Ultrasound • ECG, Echocardiography, Spirometry, Gastro-upper and lower endoscopy, Colonoscopy, Treadmill test • 24 hours Laboratory services: All types of tests- Microbiology, Biochemistry, Cytology, Immunology, Hematology, Virology & Serology services, blood bank
Emergency	<ul style="list-style-type: none"> • 24 hours emergency services, Mass casualty management (Disaster management) with trained team and Ambulance services
OPD & Indoor Services	<ul style="list-style-type: none"> • General beds, double bed cabin and single bed deluxe cabins in Medicine, Surgery, Urology, Obstetrics & Gynecology, Orthopedics, Pediatrics, V.D., Dentistry, Burn and Plastic Surgery and Geriatric services, , HDU (High Dependency Unit), Neuro rehab psychiatry
Special Clinics	<ul style="list-style-type: none"> • MCH/town Clinic: service include preventive health care, family visits, health education, community health services and immunization • Outpatients Male, Female and Children's Clinic • General Surgical Consult • Orthopedic consult • Ante Natal Clinic, Leprosy, TB, HIV-ART, Diabetes clinics • Dental Clinic • General Appointment Clinic • Endoscope, Ultrasound, Echo, X-ray, Laboratory • Physiotherapy, Neuro Rehab, Occupational Therapy • Psychiatry • Pharmacy
Operation theatres	<ul style="list-style-type: none"> • All types of general surgery
Special Services	
Special health package services	<ul style="list-style-type: none"> • Staff family health package • Institutional/Organizational health services • General medical checkup package
Social Health Services	<ul style="list-style-type: none"> • Town clinic and Satellite MCH clinics • Child Nutrition Rehabilitation Centre • Health camps in rural areas • Safer Motherhood and neonatal program • Special health services for marginalized and poor patients • Health education program • Disability, Gender, HIV peer education program • Healthy School • FM radio health Program

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Patients are referred	<ul style="list-style-type: none"> • Patients are referred to the other hospital according to their diseases nature by the Hospital • The district hospital Palpa refer to the United Mission Hospital, Tansen • UMHT refer Bharatpur Cncer Hospital, Lumbini Medical College, TUTH, Gangalal and Kanti hospital and UMC, Bhairahawa for ICU.
Beneficiaries	People of Palpa, Gulmi, Arghakhanchi, Syangja, Baglung, Rupandehi, other 30 districts and India too

Source: UMHT, 2021

2.2.3 Project Activities

2.2.3.1 Human Resource Requirements

After upgrading of hospital 283 human resources will be required to run hospital. The detail of human resources is given in table 2-3

Table 2-3: Required Human Resources for Running of 200 Beds

SN	Post	Human Requirement
a) Human Resource for good governance and management		
1	Medical Director / Superintendent Medical	1
2	Matron	1
3	Hospital Management officer / Administrator	1
4	IT officer /Helper	2/3
5	Biomedical Engineer / Helper	2/3
6	Medical Recorder (Medical Recorder officer/ Helper	2/4
7	Hospital Finance Administrator (Account Officer /Accountant/ Account helper)	1/2
8	Storekeeper	1
9	Receptionist	1
	Total	24
(B) Human Resources for Clinical Services		
1	Medical Specialist	According to Department in hospital
2	General Physician	2
3	General Surgeon	2
4	Gynecologist and Obstetrician	2
5	Pediatrician	2
6	Anesthesiologist	2
7	Orthopedic Surgeon	2
8	General Practioner	2
9	Dental Surgeon	2
10	Dermatologist and Venerologist	2
11	Psychiatrist	1
12	ENT Surgeon	1
13	Pathologist	2
14	Ophthalmologist	1
15	Radiologist	2
16	Plastic , Reconstructive, Aesthetic and Hand Surgeon	As per speciality available
17	Neonatologist	1
18	Critical Care Physician	1

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19	Medical Officer	48
20	Nursing Supervisor	3
21	Nursing Officer	16
22	Nursing Staff	80
23	Para medical Staff /HA	24
24	Senior Pharmacist/ Pharmacist Officer/ Pharmacy Assistant	1/2/10
25	Assistant Anesthetic	8
26	Dental Hygienist	2
27	Dental Assistant	2
28	MO/Optomtrist	1/1
29	Ophthalmic Assistant	2
30	Medical Legal and Forensic Service	MD Forensic medicine -1, MO-2
31	Physiotherapy (Physiotherapist /Physiotherapy/Technician/ Assistant	1/1/4
32	Dietician	1
33	Senior Dietician	1
	Total	238
(c) Human Resources for Hospital Support Service		
1	Nutrition Service	1-Senior Dietitian 1- Dietitian
2	Housekeeper	1
3	CSSD	3
4	Laundry & Housekeeping	3
5	Security	24 hour
6	BMET	1-Biomedical Engineering 1-Diploma
7	Social Service unit	6
8	H.A.	As per needed
9	Security	As per needed
10	Plumber	2
11	Electrician	2
12	Gardener	As per needed
13	Office Helpers	As per needed
	Total	21
Total Human Resources		283

Source: Health Facilities Operating Standard, 2077

Table 2-4: Existing Technical Staffs working in United Mission Hospital Tansen

SN	Field of Expertise	Full Time	Total
1	Sr. Nurse Anesthetist	6	6
2	AAC Trainee	2	2
3	ANC	52	52
4	CHD Chief	1	1
5	Sr. Staff Nurse	15	15
6	CSSD Assistant II/ In charge/ Helper	7	7
7	House Officer	12	12
8	Medical Office	8	8
9	Nutrition Facilitator	1	1
10	DMS/Sr. Dentist/DRO	2	2
11	Dentist Assistant/ hygienist	4	4
12	Medical Superintendent	1	1

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13	Chief of Surgery/ ortho	1	1
14	General Surgeon	5	5
15	Nursing Superintendent	1	1
16	Nursing Supervisor	3	3
17	MD(GD)	9	9
18	Orthopedic Surgeon	3	3
19	Senior Pediatrician	1	1
20	MDGP Resident	7	7
21	Anesthesiologist	1	1
22	Lab Assistant	1	1
23	Sr. Staff Nurse Sorter	2	2
24	Sr. Ultrasound Technician	1	1
25	Ultrasound Technician	2	2
26	Imaging Supervisor	1	1
27	X-Ray Technician	5	5
28	Jr. X-ray Assistant	2	2
29	X- ray Assistant/ helper	2	2
30	Sr. Assistant (USG)	1	1
31	Lab Technician	10	10
32	Lab Supervisor	1	1
33	Lab Assistant	5	5
34	Laboratory Clerk	1	1
35	Laboratory Helper	1	1
36	Jr. Neuro Rehab. Assistant	1	1
37	Sr. Occupational Therapy Assistant	1	1
38	Sr. FP Clinic Nurse	1	1
39	CMA	19	19
40	CMA(male Nurse)	4	4
41	Health Assistant	3	3
42	Medical Assistant	1	1
43	OPD supervisor	1	1
44	Senior Biomedical Assistant	1	1
45	Sr. Bio Medical Equipment Technician/Bio Medical Equipment Technician	3	3
46	Mechanical Overseer	1	1
47	Maintenance / biomed adviser (Eng)	1	1
48	Sr. OPD Assistant	5	5
49	Dressing Room Assistant/Senior Dressing Room/Endoscopy Assistant	2	2
50	OPD Assistant	5	5
51	OR Supervisor	2	2
52	Sr. OR Technician	2	2
53	Sr. Nurse Aide I	2	2
54	Staff Nurse	27	27
55	Civil Overseer	1	1
56	Sr. OR Assistant	2	2
57	OR Assistant	1	1
58	OR technician	1	1
59	MOR Technician	1	1
60	HCT Counselor	1	1
61	Sr. Pharmacy Technician	2	2

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62	Pharmacy Technician	3	3
63	Sr. Pharmacist	1	1
64	Jr. Pharmacy Assistant	2	2
65	Pharmacy Helper	1	1
66	Physiotherapy Incharge	1	1
67	Sr. Physiotherapy Technician	1	1
68	Physiotherapist	2	2
69	Physiotherapy Technician	1	1
70	Sr. Ward Sister/Nursing Supervisor	1	1
71	Sr. Ward Sister	1	1
72	Graduate Staff Nurse	2	2
73	Dietary/Health Educator	1	1
74	Nurse Educator	2	2
75	Occupational therapist	1	1
	Total	288	288

2.2.4 Hospital Waste Management Plan

The hospital is in operation phase so different types of waste are generated. The health care waste can be of hazardous and non-hazardous waste. The Hazardous waste include infectious waste, blood contaminated waste and pathological waste. The non-Hazardous waste includes general waste (paper, plastic, bottle, can etc.). In context of national scenario average per bed waste generation per day in hospital was found to be 1.7 kg/ bed (Source: MoH, 2003). Based upon this rate, operation of 200 beds hospital will generate 340 kg in one day. Beside this health waste, 283 human resources will generate 141.5 kg per day and 500 out patients will generate 250 kg per day. So the total wastes generate by hospital will 731.1 kg per day. The category of health care waste generated from hospital is summarized in table no. 2-5

Table 2-5: Categories of Hospital waste

Waste category	Description and examples
Infectious waste	Waste suspected to contain pathogens e.g. laboratory cultures; waste from isolation wards; tissues (swabs), materials, or equipment that have been in contact with infected patients; excreta
Pathological waste	Human tissues or fluids e.g. body parts; blood and other body fluids; fetuses
Sharps	Sharp waste e.g. needles; infusion sets; scalpels; knives; blades; broken glass
Pharmaceuticals waste	Waste containing pharmaceuticals e.g. pharmaceuticals that are expired or no longer needed; items contaminated by or containing pharmaceuticals (bottles, boxes)
Chemical waste	Waste containing chemical substances e.g. laboratory reagents; film developer; disinfectants that are expired or no longer needed; solvents

Health Care Waste Categorization

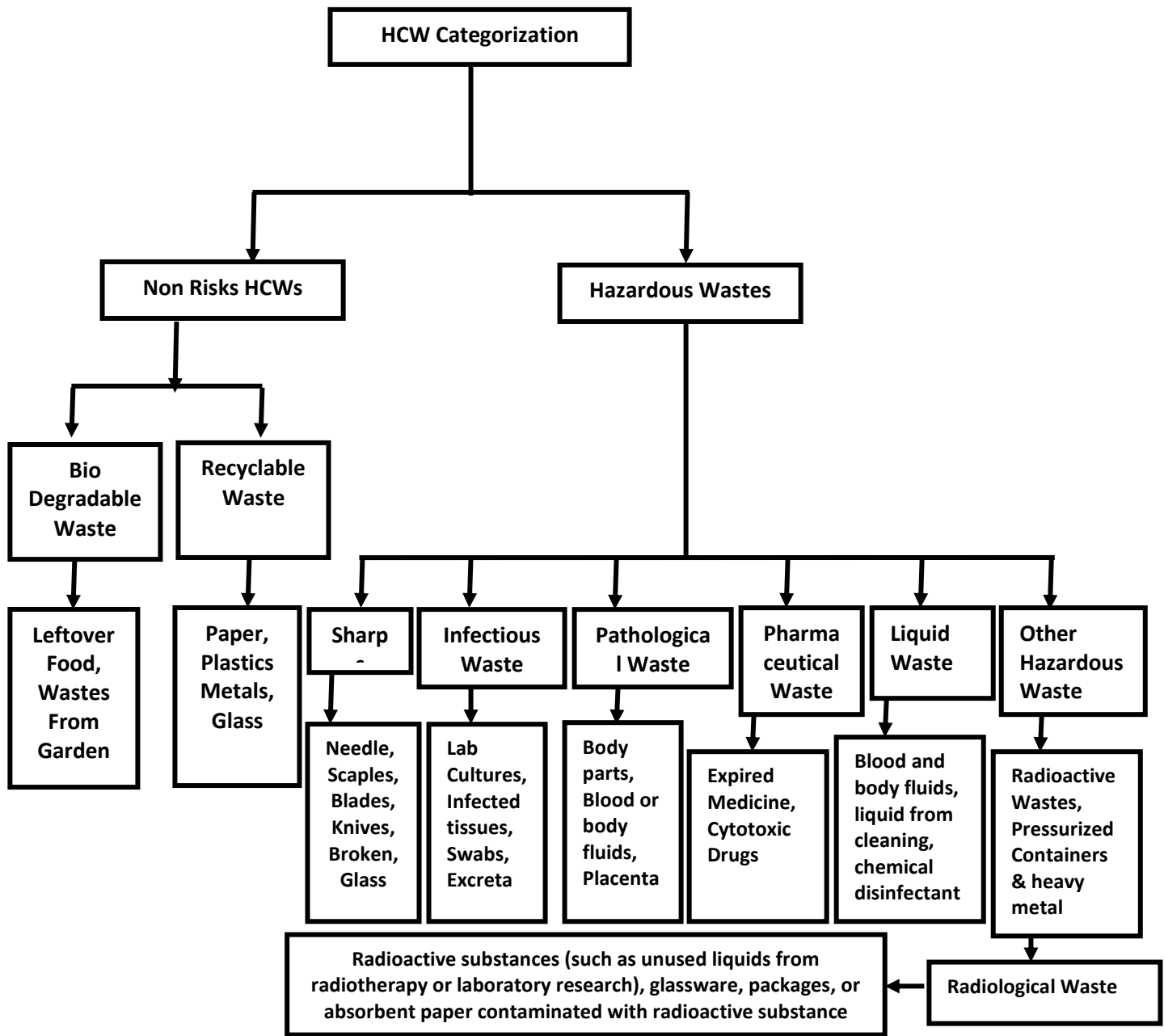


Figure 2-3: Categorization of Health Care Waste (Source: National Health Care Waste Management Standards and Operating Procedure-2020)

The collected wastes are screened at the source site and hazardous and non-hazardous waste is segregated. The treatment methods depends upon the types of waste materials, the methods include chemical disinfections, autoclave, encapsulation etc. Similarly, the sharp waste like syringe, needle, broken glasses are disposed safely. The pathological wastes and the placenta are sent to the biological pit to make biogas. E-waste generated from the hospital includes battery, charge, cable line are managed by selling to recycling factory. The waste generated from human resources working in the hospital, staff quarter and canteen are non hazardous which are managed by composting and sending to waste collection centre inside hospital. Beside this, the hospital health will follow the rules

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prescribed by MoHP for safe disposal of waste. The waste generated from hospital are disposed and treated as per the National Health Care Waste Management Standards and Operating Procedures, 2020. The hospital has been following 6R (Rethink, Reuse, Recycle, Rethink, Reduce, Repair) principle in management of health care waste. The health care waste management practice in shown in 2-6.

Table 2-6: Waste Management Practices in wards of the Hospital

Waste Categories	Color Bucket used for waste collection
Biodegradable Waste	Green
General Waste (Paper, Plastic, non degradable)	Blue
Infectious waste	Red

Source: Field Visit, 2021



Plate 2-1: Waste Segregation Practice in Hospital



Plate 2-2: Waste Collection Centre



Plate 2-3: Pathological waste management centre

Management of Dead Body

The hospital has constructed mortuary room. Dead bodies are kept in that mortuary room for certain time period.



Plate 2-4: Refrigerator for dead body

Treatment and management of health care waste

Table 2-7: Treatment and management of health care waste

S.N.	Waste type	Management
1	Infectious waste	For the management of Infectious waste, hospital has installed autoclave technology to disinfect the infectious waste. In autoclave technology, the infectious waste like blood contaminated cotton; gauge, patient's clothes, syringes etc are boiled with high temperature (121°C) and pressure. The pathogens and bacteria contained in the infectious waste will be killed in that temperature and pressure then the boiled waste becomes disinfections.
2	Pathological waste and sharp waste	The hospital has placenta pit for the final disposal of pathological waste (e.g. body part, placenta etc.). The hospital will also construct sharp pit for final disposal of sharp waste (Syringe, needles, broken glasses etc.).
3	Highly hazardous liquid waste from Operation Theater	Chemical disinfectants method is used to treat waste water coming from Operation theatre and laboratory. The hospital will construct waste water treatment plant in the hospital premises.
4	Biodegradable waste (Canteen waste)	Use in making compost fertilizer
5	Reusable waste (Paper, Plastic, bottles)	Sell to the waste vendor
6	Non reusable waste (broken glass, dust etc)	buried in save and open place

2.2.5 Water Supply and Sanitation

The hospital has small spring, from which water is drawn and the hospital saves rainwater from the roofs of the hospital and stores it in underground water tanks. Water demand

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during the operation period of 169 bed hospital is estimated about 50,000 liter per day and with operation of 200 beds, 70,000 liters water will be consumed per day. To fulfill the demand of water, water is lifted from the natural spring water located near the town. Beside this, rain water harvesting technology will be used. The hospital has 8 underground tanks for storage of water. For drinking purpose, the spring water is used. Euro guard filter are kept in each floor of the hospital to treat the drinking water. Toilets are also available in every floor of the hospital. Cleaners will take most care to maintain the cleanliness and hygiene level of each toilets as well as hospital in and outside premises



Plate 2-5: Euro guard filter for drinking water Purification

Table 2-8: Water Source and Consumption

Particulars	Description
Water Source	Rain water (collection), Spring water
Spring water (lifting)	70,000 liters per day
Water consumption/day (for 169 beds)	50,000 liters per day
Water consumption/day (for 200 beds)	70,000 liters per day
Tank capacity	2,194,492

2.2.6 Waste water management

Currently septic tanks are constructed for waste water management. There are 4 septic tanks for waste water collection. Hazardous waste water from Operation Theater and lab will be collected in separate tanks. Waste water generated from hospital will be sent to soak pits after treatment only. After up gradation to 200 beds, waste water treatment plant will be constructed.

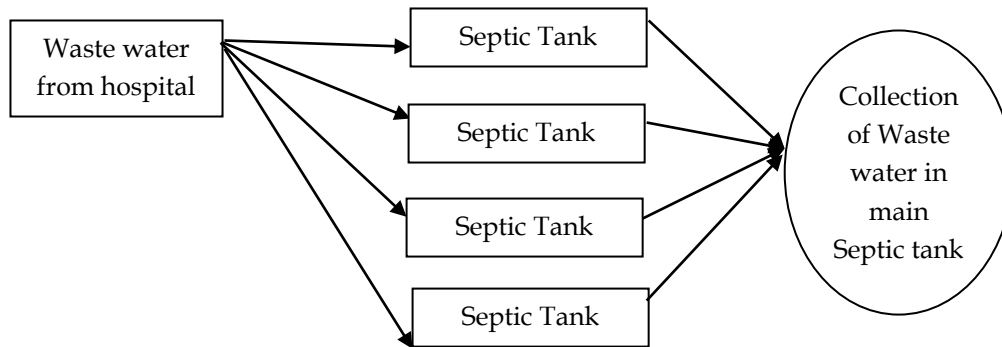


Figure 2-4: Drainage and Sewage Management at Present

- **Waste water Project**

The hospital is planning to establish waste water treatment plant for treatment of waste water from hospital including the drainage of the community near by the hospital. The biological and chemical waste treatment will be kept separately. The detail of waste water treatment plant is attached in Annex X. The waste water is treated in 3 steps which are described in following steps.

- 1. Transport system**

The waste water from the hospital, houses from Bhusaldada village, the canteen and the compound buildings will have to be transported to the treatment plant. Hospital will install a two pipe system for transport of waste water.

- 2. First Line Treatment**

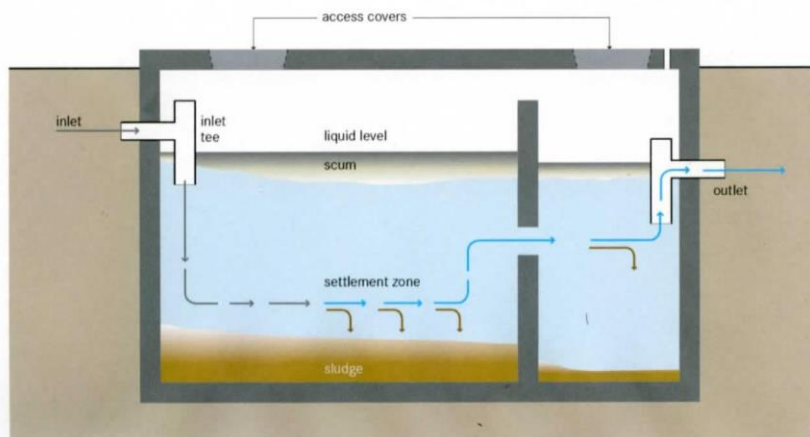


Figure 2-5: First Line Treatment

On the hospital compound, first-line treatment is available for all buildings except the hospital. The living quarters, guest house etc. are all equipped with a septic tank. The black water from the hospital is not given any treatment. Therefore, a first-line treatment plant should be built for the hospital. The waste water from the hospital, 40 m³ per day, should be put through a standard septic tank with a capacity of 250 m³. It was considered to use an improved septic tank named an Anaerobic Baffled Reactor (ABR). It was decided to use an ordinary septic tank as an Anaerobic Baffled Reactor (ABR) has a little

more efficiency (5-10%), but is more complicated to operate. A second line treatment is also available in the form of a wetland. This solution is thought to be the most cost effective. Two septic tanks with a capacity of 125 m³ will be built. The inside dimensions will be 12.50 x 5 x 2 meters. These tanks will be located near the road to the nursing campus. This location gives the opportunity to remove the sludge into trucks to be brought to a disposal area.

3. Second line Treatment

The effluent from the septic tanks, the water from the washing room facility from the hospital has to be treated in a secondary treatment plant. The choice has been made for a wetland as this is a simple solution with minimal maintenance, whereas the water quality from its effluent is up to international standards. The effluent will be discharged into the gully where at the moment the hospital waste water finds its way down the hill. This will have a huge impact on the surroundings as further downhill near this gully springs exist from where people derive their drinking water from.

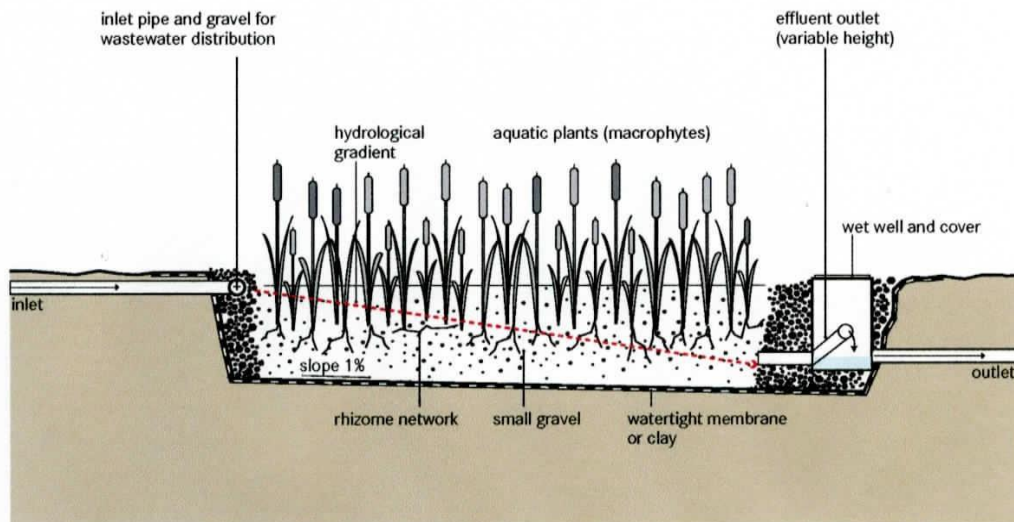


Figure 2-6: Schematic Length Section

This wetland will be located at the same piece of land, donated by Nepal's Forest Department on which the septic tanks will be realized. This is just below the road to the Nursing Campus. This land is owned by the Forest Department. The Forest Department allows the hospital to use this land for this purpose. The dimensions of this wetland are: 75 x 11 x 1 meter. See below for a principle length section and across section

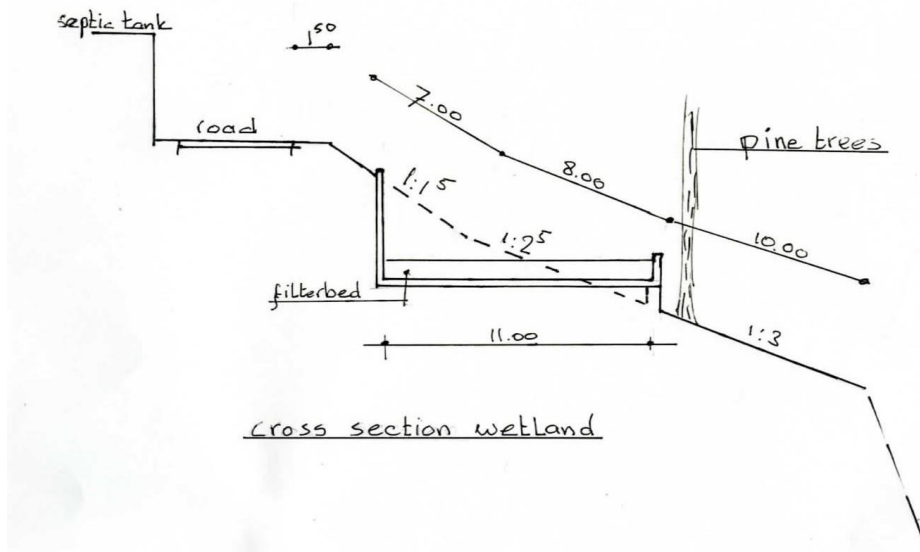


Figure 2-7: Cross Section Wetland

2.2.7 Rain water harvesting

Rain water harvesting system has been installed in the hospital for storm water management. Open space has been allocated for the ground recharge and infiltration of water. The main source of water in the dry season in hospital is reserved rain water and spring water. The stored rain water covers about 17% of total water requirement in a day of the hospital.

2.2.8 Emergency preparedness

To prevent from the possible fire hazard, the hospital has been fitted fire extinguishers in each floor of hospital. The adequate information is to be dispatched on wall for fire safety measures like “No Smoking Zone”. Beside this the building of the hospital is constructed as per National Building Code of Nepal. The proper security system, alarm and PAS (Public Announcement System) for emergency announce. The Hospital has emergency exit door in the block of hospital. Hospital will provide training of occupation safety and evacuation to all staffs including fire and earthquake safety.

Table 2-9: Safety and Disaster Preparedness

Particulars	Description	Remarks
Fire escape	1 nos.	Staircase
Fire Extinguisher	Fire extinguisher Cylinder in every floor of the hospital	From basement to the top floor
Emergency Alarm	Installed	Every department
Emergency Assembly Point	in front of the building and east maternity building	
Security Guards	10 nos.	
Coordination with Security forces	Regular coordination and meetings and security update	

2.2.9 Solar Energy and Sun Boilers

For the clean source of energy, Solar PV panels and solar heater are installed in the resident for water heating for the laundry on the hospital roof. It helps to reduce the use of diesel generators and also helps to maintain hospital surroundings environment friendly. In future the hospital is planning to add solar energy as an alternative energy for other purposes too. The hospital has a laundry where clothing and linen of the hospital is being washed. They use a lot of hot water. This water is heated by means of electricity. Communal electricity is not very reliable, regularly power is shut off and hospital has to switch to its own diesel generator. This isn't cheap and also bad for the environment. In 2014 the hospital installed sun boilers with which the hot water for the washing area is heated.

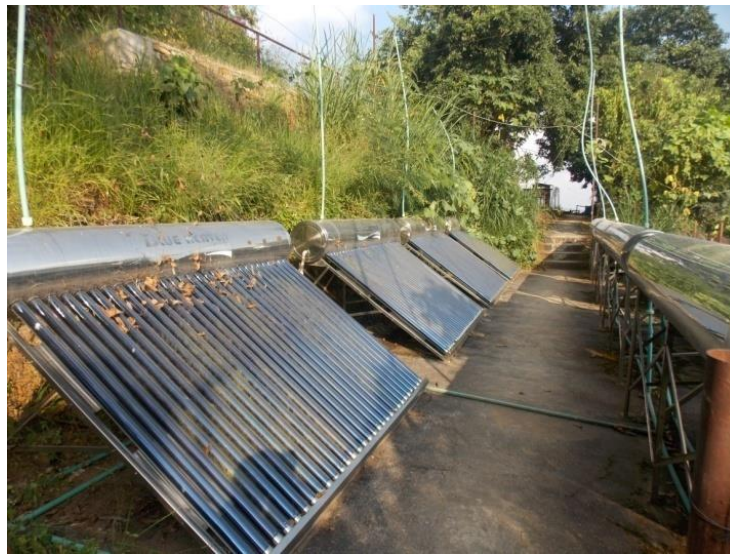


Plate 2-6: Installed Solar Heater

2.2.10 Food Hygiene

Food Hygiene ensures the safety of food from production to consumption. Food can be contaminated at any point during storage, distribution, transportation and preparation. Lack of adequate food hygiene can lead to food borne diseases and death of the consumer. Hence, food hygiene will be maintained with safer management of catering in the hospital, where non-professional food handlers, like nursing or domestic staff, are involved in food service functions. The hospital has clean and systematic canteen within the hospital area. Also the hospital prepares SARBOTTAMPITHO within the hospital to maintain the food hygiene for the children.



Plate 2-7: Hospital Canteen

2.2.11 Mercury Free Dentistry

Mercury is dangerous to public health and environment, so its importation and uses especially in the hospital will be prohibited. The hospital had already eliminated the mercury thermometer before few years ago. Mercury lights are also replaced by LED lights. The hospital is planning to use totally mercury free equipments.

2.2.12 Environment friendly management

The hospital has been adopting environment friendly technology such as solar energy, rain water harvesting etc. in future. For the clean source of energy, Solar PV panels have been installed in hospital premises. Beside this rain water harvesting system is to be adopted in the hospital to reduce extraction of ground water. Open space and recharge pits are allocated for ground water recharge. The hospital has replaced fluorescent lighting with LED bulbs. Apart from this the hospital has been managing solid waste by 6R principle and also plant more trees to maintain greenery in hospital premises.

2.2.13 Energy and Fuel

The electricity will be supplied in the hospital from National Transmission Line. In addition, two generators are used during load shedding to supply electricity in the hospital wards. It is estimated that 10,000 liters of diesel will consume during the operation of the 200 beds hospital annually.

2.2.14 Disaster Management

Earthquake and fire safety have been the prime concern of the proponent from the point of disaster management. The proponent has design procedures to identify potential emergency conditions and response to disaster state. Hospital buildings have been designed as earthquake resistant and installation of emergency safety instruments and alarms in the buildings maintained. Fire Extinguisher cylinder and emergency exit has been placed in present buildings. Lightning arrester is used to protect from lightning. Beside this training and awareness program about emergency and preparedness plan will be conducted time to time

2.3 Proposal's Objectives:

The main objective of the proposed project is to upgrade United Mission Hospital Tansen by environment friendly and socially acceptable manner.

Chapter 3 : Study Methodology

3.1 Desk study

3.1.1 Literature review

The main documents that were reviewed during EIA study are engineering drawing and soil test report. Apart from this, data from Central Bureau of Statistics were also collected. The maps of project area were interpreted to extract necessary information particularly on physical aspects.

3.2 Project Impact Area Delineation

Based on the judgment of the experts involved, the direct impact area and indirect impact area have been proposed as follows:

3.2.1 Direct Impact Area

This is the area, which include built up area inclusive of the 200 bed hospital and nearby settlement. Besides the owned land of area of 13,575.33 m² in ward no 1, the direct impact area of hospital include land areas of 500 meters surrounding of the hospital, the sewerage and the effluent discharged area and the solid waste collection and disposal area.

3.2.2 Indirect Impact Area

The indirect impact area of the project include ward no.1 of the Tansen Municipality and additional areas which will be affected due project operation such as mobility of the people, road traffic, noise, and vibration. Certain aspects of the proposal have effect on the nation as a whole, mainly with regards to economic and health services benefits.

3.2.3 Project Affected Families

The operation of hospital has number of beneficial and adverse impacts to the nearby settlement. As proposal confines within Tansen Municipality-1 those families within 500 m radius has been taken as project affected families of this project.

3.3 Field Study

Regarding the various environmental issues and to address those issues, an extensive site inspection was carried out by a multidisciplinary team led by the team leader, environmentalist, engineer and socio-economist. During the visit, baseline information on physical, chemical, Biological, and socio-economic and cultural conditions of the direct and indirect impact areas of the project were collected. During field survey, physical, biological and socio-economic and cultural environment data were collected. The sub-sections below present briefly the various approaches and methodological tools used during the field investigation. During the Field visit the team member discussed with different people of that locality on the potential issues. Field visit was conducted from 2078/04/29 to 2078/05/02. During field, data on physical, biological, socio-economic, and cultural environment were collected.

3.3.1 Physical Environmental Survey

Field observation and walkthrough survey was adopted to verify information on drainage system, land stability, hydrological study of area, water sources, solid waste management system, ground water condition etc. The water samples of hospital were collected and analyzed. The Noise level at in and outside of the hospital was measured by Sound level meter (SL-4001). The air quality was measured by air visual pro.

3.3.2 Biological Environmental Survey

The biological component generally refers to flora and fauna, their present status, description and habitats. The status of the flora and fauna of the study area was determined by Reconnaissance survey of project area and surrounding area as well as Interviews and discussion with local informants.

3.3.3 Socio-economic and Cultural Survey

Secondary sources data were utilized for understanding socio economic condition at the project area. Key Informant’s Interview and public consultation were done to collect the baseline information on socio- economic, cultural and historical aspect of the area. The survey was so designed that it comprised the questions of demography, economic status, literacy, ethnicities, religion and views regarding the project, expectations from project, historical and archaeological significance of project area. Key informant interviews were also conducted with following people.

Table 3-1: Lists of Key Informants

Name of Person	Address	Post/Occupation	Contact no.	Suggestions
Renuka Gaire	Tansen, municipality-1, palpa	Health volunteer	9844772676	-The hospital should have a well-equipped Lab. -The service of CT-Scan should arrange at hospital.
Janak Prasad Basyal	Tansen, municipality-1, palpa	Former Police		-Benefits from the hospital’s health care facilities. -information on the socio-economic status of the Project affected area.
Lila Devi Neupane	Tansen, municipality-1, palpa	President (Aama Samuha)	9847497202	-Skill-oriented and public awareness programs should be arranged. -public awareness program should be conducted on women’s health and children’s health.
Jayram Sapkota	Tansen, municipality-1, palpa	President(Hotel Management Committee, palpa)	9847028252	-The hospital is operating in environment-friendly manner and this work is should be continued in future as well.
Rajendra Prasad	Tansen, municipality-	Teacher	9847028548	-Parking lot should be arranged within the hospital

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Basyal	1, palpa		area. -The waste water treatment system of the hospital is so appreciating, this work is should be continued in future also.
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Source: Field Visit 2021

3.4 Public consultation

Two Public Consultations were conducted on 2078-04.-30 at different places with Aama Samuha and local people to collect the views about operation of project.



Plate 3-1: Public Consultation meeting with Aama Samuha



Plate 3-2: Public Consultation meeting with local people

Table 3-2: Concerns shown by stakeholders during public consultation

Public Consultation	Number of Participants	Raised Issues	Where considered in Report
Public Consultation in ward no. 1	8	<ul style="list-style-type: none"> • Employment opportunity should be provided to the local people according to their qualification. • Parking area of the hospital should be managed properly • Token System should apply to get ticket • Hospital lab should manage properly. 	<p>Chapter 8, table no.8-1</p> <p>Chapter 2, table 2-1</p> <p>Chapter 8, table 8-4</p> <p>Chapter 2, table 2-2</p>
Mamata Aama samuha	7	<ul style="list-style-type: none"> • Parking area of the hospital should be managed properly • Hospital lab should manage properly. • Training about health and sanitation should provide to members. 	<p>Chapter 2, table 2-1</p> <p>Chapter 2, table 2-2</p> <p>Chapter 8, table no.8-3</p>

3.5 Public Hearing

A public hearing program was organized on 2078/04/30. Local people and concerned stakeholders were attained the public hearing program. Beside this representative from concerned Municipality and ward etc. were also participated in the programme.



Plate 3-1: Consultant briefing about EIA



Plate 3-2: Addressing Public Hearing Program by President of ward no. 1



Plate 3-3: Addressing Public Hearing program by Hospital Owner



Plate 3-4: Public Participation in Public Hearing Program

About 30 Participants were participated in the public hearing. Local people and representative of different institution expressed their views toward the hospital. A summary of the public hearing deliberation and comments and suggestions are incorporated in report. Their relevant concerns are addressed in environmental mitigation measures and enhancement measures chapter. From the interaction meeting and public hearing, it was found that the local people and the project affected people have positive feeling toward the hospital project.

Table 3-3: Concerns shown by stakeholders in response to the public hearing

S.N.	Raised Issues	Where considered in Report
1	Hospital should be operated without harming environment	Chapter 8, table no.8-2
2	Employment opportunity should be provided to the local people according to their qualification	Chapter 8, table no.8-1

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3	Waste water released from hospital should be treated before sending to sink	Chapter 8, table no.8-2
4	Parking area in hospital area should be maintained in proper way	Chapter-2, table 2-1
5	Token System should applied to get ticket in the hospital	Chapter 8, table 8-4
6	Hospital lab should be managed properly	Chapter 2, table 2-2
7	ENT services should also be operated	Chapter 2, table 2-2
8	CT scan services should add in the hospital	Chapter 2, table 2-2
9	Waste water treatment plant project should implement as soon as possible.	Figure 2-4, Figure 2-5

3.6 Notice Pasting and Publication

The public notice was pasted in project affected Municipality office, ward office, government school, health post for seeking written opinion from the concerned people and institution on possible impacts from implementation of the project. “muchulka” was also prepared at the time of draft notice pasting. After pasting of the draft notice same notice was published in “Arthik Abhiyan” daily newspaper date on 2078/05/02 which is attached in Annex VII. The public notice was prepared according to Schedule 9 of EPR, 2077.



Figure 3-1: Public Notice Pasting

3.7 Impacts Identification, Prediction and evaluation methods

The following methods were used to identify impacts, predict and evaluate the project activities on the environment:

Expert judgment

Expert system incorporates the knowledge and experience of experts from the relevant disciplines into the structure decision making analytical tools. The judgment and prediction likely outcomes are the integral part of an expert judgment.

Impact Matrix

An impact matrix were developed and used to identify project impacts on physical, biological and socio-economic environment and cultural environment during operation phase of the project.

Impact prediction methods

Impacts were predicted by using statistical tools, geographical information system (GIS) field and experts judgment. The judgment refers to the use of technical or local expertise.

Impact evaluation methods

Impacts were evaluated taking into consideration of national policies, laws, standards and international commitments. Once the impacts have been identified and predicted, they are evaluated in terms they are significant and insignificant. The environmental impacts were evaluated on the basis of magnitude, extent & duration of the impact. If the impact lasts up to 3 year, it is termed as Short term (ST). If impact continues for 3 to 20 years, it is termed as Medium term (MT) and if it lasts beyond 20 years, it is considered as Long term (LT) (National EIA guidelines 1993).

For the impact evaluation, the matrix method with numerical ranking was used for the quantitative ranking of the predicted impacts.

Table 3-4: Numerical Scale in the National EIA Guidelines, 1993

Magnitude	Score	Extent	Score	Duration	Score
High/Major	60	Regional	60	Long Term	20
Moderate/Medium	20	Local	20	Medium Term	10
Minor/Low	10	Site specific	10	Short Term	05

(Source: National EIA Guidelines, 1993)

The maximum scores will be 140 and a minimum value will be 25 which will help to know about the significance of impacts.

The cumulative scores on these analyses were used to decide on the significance of the impacts.

Table 3-5: Cumulative scores of level of significance

Total scores	Significance of Impacts
<45	Insignificant
45 to 75	Significant
>75 to 100	Very significant

(Source: National EIA Guidelines, 1993)

The different terms are categorized in given way.

Magnitude: This can be Low-**L** (minor), Medium-**M** (moderate), and High-**H** (major), depending on the scale or severity of change.

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Geographical extent: If the action is confined to the project area, it is referred as site-specific (**SS**), if it occurs outside area but close to project area, the extent of impact is local (**Lo**), if it occurs far away from the project, it is referred as regional (**R**).

Duration: It can be Short Term (**ST**-i.e. less than 3 years), Medium Term (**MT**-i.e. 3-20 years), and Long Term (**LT**-i.e. more than 20 years).

3.8 Recommendation Letter Collection

The recommendation letter was collected from the Tansen Municipality ward 1 which is attached in Annex VIII.

3.9 Preparation of EIA Report

The draft EIA report of United Mission Hospital Tansen was prepared on the basis of format given by Schedule 12 of EPR, 2077.

Chapter 4 : Review of Legal Documents

The following policies, acts, rules, regulations, guidelines, standards and conventions were reviewed during the EIA study.

Review of legal Document	Attracted articles /Policies /Act/ rules / clauses / related to the Project
Constitution of Nepal	<p>Article 3(30) of the constitution states each person shall have the right to live in a healthy and clean environment. The victim of environmental pollution and degradation will have the right to be compensated by the pollutant as provided for by law.</p> <p>Article 3(35) (1) of the constitution also states Every citizen shall have the right to free basic health services from the State, and no one shall be deprived of emergency health services and also Article 3(35) (2) each person shall have right to get information about his or her medical treatment and article 35(3) equal access to health services in additional to article 35(4) have the right of access to clean drinking water and sanitation.</p>
Plans	
15th Plan, 2076/77-2080/81 B.S.	The 15 th five-year plan also states that contribution of services sector in gross domestic product (GDP) can reach 57.6 per cent by fiscal 2023-24 while the contribution of the agriculture sector and industrial sector in the national GDP can reach 22.1 per cent and 20.3 per cent, respectively
Second Long Term Health Plan, 2054-2074 BS	The SLTHP envisions a healthcare system with equitable access and quality services in both rural and urban areas. The system would encompass the concepts of sustainability, full community participation, decentralization, gender sensitivity, effective and efficient management, and private and NGO participation.
Policies	
National Health Policy, 2076 B.S.	The National Health Policy, 2076 was adopted for the improvement in the health condition of the people of Nepal. The primary objective of the National Health Policy is to extend the primary health care system to the rural population so that they get benefit from modern medical facilities and trained health care system.
National Environment Policy, 2076 B.S.	<p>The main objectives of National Environment Policy area;</p> <ul style="list-style-type: none"> • To prevent and mitigate water, air, soil, noise, chemical, radioactive pollution • To manage solid waste generated from household, industry and other areas • To develop garden and greenery in Urban area • To mainstream environment in all development area • To ensure public participation for environment protection and sustainable management of natural resources
National Climate Change Policy, 2076 B.S.	<p>The main objectives of the National Climate Change policy are as follows:</p> <ul style="list-style-type: none"> • To reduce GHG emissions by promoting the use of clean energy, such as electricity, renewable and alternative energies, and by increasing energy efficiency and encouraging the use of

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	<p>green technology;</p> <ul style="list-style-type: none"> To adopt a low-carbon development path by pursuing climate-resilient socio-economic development
Nepal Health Sector Strategy, 2072-2077	The goal of this strategy is to improve the health status of all individuals through a minimum health care delivery system. It embodies the philosophy and goals set out in the National Health Policy and have a constitutional provision guaranteeing access to basic health services as a fundamental right of every citizen. This strategy demonstrates the nation's commitment to achieving International Health Coverage (IHC) and this strategy also provide basis to mobilize the necessary resources and investments.
Acts	
Building Act, 2055 B.S.	The aim of this act is to strengthen building against earthquake, fire and other natural calamities. Section 8 of this act classifies building in 4 categories based on floor number, plinth area and structural plan. According to section 10 of this act, it is mandatory to construct building as per the standards of building code. Section 11 of this act made compulsory to approve design and map of building. Section 14 (1,2 and 3) has provided the right to municipality and urban development office to stop construction of building without approved design and out of standards of building code and also provide right to demolish and charge fine for such buildings.
Industrial Enterprise Act, 2073 BS	. As per section 11, license and registration certificate shall clearly contain matters relating to the facilities and concessions to be enjoyed by the industry and prescribed terms and condition to be observed by the industry. The health worker and health organization security coordination committee shall be formed as per the section 5.
Security of the Health Workers and Health Organization Act, 2066 B.S.	In section 3 of this Act, there is provision of prohibition on doing acts such as mishandling, lockout and destruction. In section 5 there is provision relating to formation of committee. The functions, duties and powers of the committee shall be as follows: <ul style="list-style-type: none"> (a) To approve plans and programmes relating to the security of the health workers and health organizations and implement, or cause to be implements such plans and programs (b) To maintain coordination between the concerned bodies as to the security of the health workers and health organizations (c) To provide compensation, on behalf of the health workers and health organizations, to the concerned persons pursuant to court judgments (d) To give suggestions to the Government of Nepal in respect of the policies to be pursued on the security of the health workers and health organizations
Motor vehicle and Transport Management Act, 2049 BS	According to the provisions made under this Act, motor vehicle which has been registered for any one purpose shall not be used for any other purpose. Speed limit to the ambulance and a motor vehicle used for the purpose of transporting patients has not been set. However, these vehicles shall use a special type of sound and light in order to alert the pedestrians and other motor vehicles on the road.

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<p>Solid Waste Management Act, 2068 B.S.</p>	<p>The solid waste management Act 2068 has clearly stated that the local bodies will have the authorities for solid waste management in their area. Any private agency willing to work in the solid waste management sector shall take approval or permission from the local bodies. From the collection to the disposal of the waste the local bodies shall make all the necessary arrangement for the waste management. The SWM act has urged the individual or organizations to reduce the production of the solid waste. The individual or organization shall perform segregation of the waste in source as per the prescription of the local bodies. Nobody will be allowed to set time, place and manner for discharge of solid was except local bodies. The SWM Act has clearly mentioned that harmful waste or chemical waste shall not be discharged at solid collection canter or transfer centre</p>
<p>Contribution Based Social Security Act, 2074</p>	<p>According to section 4 of this act, the employers must pay certain amount of money on the basis of worker contribution and article 10 stipulated the operation of a social operation scheme.</p>
<p>Labor Act, 2074 B.S.</p>	<p>There is a strong provision for a healthy, safe and secured environment for workers and also prescribes provisions for solid waste management and control of noise pollution into working areas under this Act. Apart from this, it has mandatory provision that only Nepali citizen can be employed on permanent basis in any enterprises.</p>
<p>Local Government Operation Act, 2074 B.S.</p>	<p>This newly formed act describes about the criteria to divide a state into municipalities or rural municipalities and respective rights, duties and responsibilities in different development and conservation sector. It clarifies the rights of municipalities/rural municipalities to form local laws, regulations and criteria for conservation of environment protected areas and species; for environmental pollution and hazard control; solid waste management etc.</p>
<p>Children Act 2075</p>	<p>Article 66 of this Act describe about offense of child abuse and Article 3 to 15 describe about children's right</p>
<p>Consumer Protection Act, 2075</p>	<p>Chapter-2 of this Act describes about provisions relating consumer protection. Under chapter 2(3) there is provision of right of the consumer and every consumer shall have the right to obtain quality goods and services. Similarly chapter 2 (4) states that regulation of goods or services and the government shall regulate the supplies, price, quality, measurement, label, advertisement of the goods and services regularly in order to protect the rights of the consumers.</p>

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Public Health Services Act, 2075	Sub-section 1 of Article 40 of this act states that the government of Nepal may set standards in this regard in accordance with federal law to minimize the impact of noise, air, water and visual pollution on public health. Similarly, Article 41 states that necessary standards related to sanitation and garbage management will be formulated.
Environment Protection Act, 2076 B.S.	Article 3 mandates IEE/EIA study for development projects; Article 4 describes about implementation of alternative analysis; Article 6 prohibits emission of pollutants beyond the prescribed standards; Article 7 describes about the approval of environmental study report.
Motor vehicle and Transport Management Act, 2049 BS	According to the provisions made under this Act, motor vehicle which has been registered for any one purpose shall not be used for any other purpose. Speed limit to the ambulance and a motor vehicle used for the purpose of transporting patients has not been set. However, these vehicles shall use a special type of sound and light in order to alert the pedestrians and other motor vehicles on the road.
Industrial Enterprise Act, 2073 BS	. As per section 11, license and registration certificate shall clearly contain matters relating to the facilities and concessions to be enjoyed by the industry and prescribed terms and condition to be observed by the industry. The health worker and health organization security coordination committee shall be formed as per the section 5.
Town Development Act, 2045 BS	The Town Development Act, 1988 provides the legal basis for implementing town development plans. Clause 9 of this act empowers the Town Development Committee to regulate, control or prohibits any act or activity that has an adverse effect on public health or the aesthetic of the town or in any way pollutes the environment. It contains penalty provisions in the form of fines for the violation of the Act.
Right to Employment Act, 2075 B.S.	Chapter 2, Section 3 of act describes about the right to employment for every citizens. Section 4 states that every citizen shall have right to choose employment according to his or her wish. Chapter 3, section 10 envision about the employment service center which will be established by GoN. Section 6 of the chapter 6, public body shall arrange an information officer to disseminate information. Similarly, section 7 mentions that for obtaining any information, a Nepali citizen shall submit an application stating reason to receive such information to information officer.
Consumer Protection Act, 2075 B.S.	Chapter-2 of this Act describes about provisions relating consumer protection. Under chapter 2(3) there is provision of right of the consumer and every consumer shall have the right to obtain quality goods and services. Similarly chapter 2 (4) states that regulation of goods or services and the government shall regulate the supplies, price, quality, measurement, label, advertisement of the goods and services regularly in order to protect the rights of the consumers.
Nepal Health Research Council Act, 2047 B.S.	The objectives of Nepal Health Research Council Act are: (a) To do, or cause to be done, study and research works on various problems which are appearing or which may appear in the future in the field of health. (b) To operate programs on consultancy service and information in order to make health related study and research programs more useful. (c) To obtain information as to the study and research or works done on health related various problems appearing in the world and give information thereof to the Government of Nepal.

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Nepal Medical Council Act, 2020 B.S.	Article 26 of the Nepal Medical Council Act states that no one shall be called medical profession until and unless registered in register book of council. He/She will not be allowed to carry out medical profession directly or indirectly as a registered medical practitioner.
Public Health Service Act, 2075 B.S.	Chapter 2 of this Act describes about Rights, Duties of Service Recipients and Responsibilities of Health Institutions. Under Chapter 2 (3) Access to and certainty of health service: (1) Every citizen shall have the right to obtain quality health service in an easy and convenient manner. Under chapter 2 (4) there is provision of emergency treatment and every health institution shall provide emergency health service as prescribed. Chapter-3 describes about health system and management of service.
Disaster Risk Reduction and Management Act, 2074 BS	Action to Chapter 11, Section 32, subsection(1) Government of Nepal shall declare a disaster threatening area, by notification in the Nepal Gazette, with specifying its borders and period thereof, if deemed necessary and expedient to doing so due to the occurrence of a severe nature of disaster in any part of the country.
Nepal Health Professional Council Act, 2053 BS	Serial no. 28 of this act describes about punishment to the medical Person. 28(1) A person who carries on the health profession in contravention of Section 20 shall be punished as prescribed. (2) A person who commits any act in violation of this Act or the Regulation framed under this Act, other than the offense mentioned in Sub-section (1), shall be punished as prescribed.
Rules and Regulations	
Building Regulation, 2066	Building regulation, 2066 guides to take the approval of design/map of the construction building layout and follow the detail prescribed procedure mentioned in it. This shall be followed by the proponent prior construction work.
Solid Waste Management Rules, 2070 B.S.	Sub rule 1 of this rule stipulates the segregation of solid waste at least organic and inorganic solid waste at its source under section 6 have to management and segregation of harmful and chemical waste separately.
Contribution Based Social Security Regulations, 2075	In chapter 2 and 3 of this regulation, there is provision of participation in the social security scheme and identity card respectively. Rule 9 and 17 mention the social security scheme business and development respectively.
Labor Rules, 2075 B.S.	Rule 16 of the Labor Rules provides flexibility to the employer to determine the work hours. The employer can determine the work hours on the basis of the nature of the work of the entity. The notice of the work hours however, should be given to all the Employees. The Labor Rules also provides that the employer may put the employee to work on rotation based on nature of its work.
Environment Protection Rules, 2077 B.S.	The newly formed rules have included three types of environment examination which are brief environment study for project under schedule 1, Initial environment examination for the project that comes under schedule 2 and Environment impact assessment for the project that come under schedule 3. Rule 4 of chapter 2 guides for the scoping works and Rule 6 guides for conducting the public hearing. Schedule 4 guides to prepare the scoping report. Chapter 3 mentions provision related to the pollution control.

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Public Health Service Regulation, 2077	According to Chapter 2, Section 3 of Public Health Service Regulation 2077, Every citizen shall receive free basic health services from every basic health service center and health institutions designated by the Government of Nepal, Provincial Government and Local Level as mentioned in Schedule 1 under the headings pursuant to Sub-Section (4) of Section 3 of the Act.
Disaster Risk Reduction and Management Rules, 2076 BS	Section(8) subsection(c) of this describes the ensure that the national building codes, building construction standards, including other approved guidelines or standards are followed, by monitoring the same;
Guidelines	
National EIA Guidelines, 2050 B.S	GoN implemented the National EIA guidelines since July 1993 prior to the enactment of the environmental legislation in order to integrate environmental aspects in the development project and programs by conducting IEE or EIA. These guidelines call for identifying socio-economic, biological, physico-chemical and cultural impacts and proposing mitigation measures to avoid, eliminate, minimize or mitigate each adverse impact to augment beneficial impacts resulting from the project.
National Environmental Health Impact Assessment Guidelines, 2059 B.S.	National Environmental Health Impact Assessment (NEHIA) Guidelines for project development deals with assessment of health impact of the various polluting activities, among other handling, treatment and disposal of healthcare wastes.
Health institution establishment, operation, standards and infrastructure Guidelines, 2070 B.S.	This guideline contains the code of conducts required for the operation of health institution and deals with the infrastructure and standards required for the operation of health institutions under different policies.
Health Care Waste Management Guidelines, 2071 B.S	This Guideline has directed provisions for Waste minimization, waste segregation and collection, waste storage and transportation/handling, waste treatment and disposal and public awareness on HCW as the initial and prime steps for the Health Care Waste Management. Furthermore, the Guideline has also differentiated the responsibility of waste producers (Health Institutions), local bodies and the national level institutions in managing the health care wastes.
Hospital Pharmacy Service Guidelines, 2072 B.S.	The functions, duties and responsibilities of this guideline are to prepare list of medicines, to inspection of hospital pharmacy time to time etc. This guideline has also provision of infrastructure of hospital pharmacy which shall have; <ul style="list-style-type: none"> • Enough space for dispensing and storage of medicines • Appropriate storage condition • Easily accessible location of pharmacy • Separate storage place for drugs to be returned and expired drugs
Disaster Management Reference Handbook - Nepal (October 2020)	The Government of Nepal has endorsed a National Disaster Risk Reduction Policy 2075 (2018) and Disaster Risk Reduction National Strategic Action Plan 2018-2030, which provides a comprehensive planning framework for disaster risk reduction and management in Nepal, encompassing different priority areas and guiding government

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	actors and stakeholders to achieve targets by adopting appropriate processes.
Standards	
National Drinking Water Quality Standard, 2062 B.S.	This standard sets the maximum limits of various parameters of drinking water.
National Ambient Air Quality Standard, 2069 B.S.	It specifies various basic indicators of air quality
National Standard of Noise Quality, 2069 B.S.	This standard sets sound limits for day and night time for various regions
Standard on Emission of Smoke in Air by New and Existing Diesel Generator, 2069 B.S.	It sets the standard for exhaust fumes from diesel generators
Nepal Vehicle Mass Emission Standards, 2069 B.S.	It sets maximum limits on the quality of smoke emitted from a variety of vehicles.
Standard for Waste Water generated from Hospital, 2076 BS	This criterion specifies the standard of wastewater to be discharged from the hospital. The maximum limits of pH, BOD, COD, Hg, CN, Cd, oil and grease, fecal coli form are specified in this standard.
Health Facilities Operating Standards, 2077	This standard sets the maximum limits of human resources and health equipment's in the health care facilities.
Municipal bye law	The building is designed according to requirements of the National Building Code (NBO) 2060 Nepal and within limits provided by building and planning By- laws 2072 B.S. Tansen Municipality, Palpa FAR: 2.5 for commercial usage building in Residential Sub-Zone, Ground Coverage: 40 % Maximum
National Healthcare waste management standards and Operating procedures, 2020	The scope of this standard and operating procedure document is to support federal, Provincial and local governments as well as all levels of health care facilities for the implementation of as safe health care waste management system, based on the best available technologies and best environmental practice in the country and local level.
International Conventions	
Basel Convention on the Control of Trans boundary Movements of Hazardous Waste, 1989	The Basel Convention concerns with the trans-boundary movements of hazardous waste and it is applicable to hospital waste as well. The convention has been signed by more than 100 countries and has a mandatory provision that all the parties should accept the principle that the only legitimate trans-boundary shipments of hazardous waste or exports from countries that lack the facilities and or expertise to dispose safely of certain wastes to other countries. The importing countries should have both facilities and expertise; Exported wastes should be labeled according to the UN recommended standards.
Stockholm Convention on	Nepal has been a party to the Convention on Persistent Organic

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persistent organic pollutants (POPs), 2001	Pollutants, which was adopted in Stockholm in 2001 in response to the urgent need for global action to protect human health and the environment from POPs. The Stockholm Convention is a global treaty to protect human health and the environment from POPs. The article 6 of the convention obliges that the hospital to develop strategies for identifying POPs wastes and to manage these in environmentally sound manner. The POPs content of wastes is generally to be destroyed and irreversibly transformed.
Minamata Convention on Mercury, 2013	Article 16 of this Convention obliges to a) promote appropriate health-care services for prevention, treatment and care for populations affected by the exposure to mercury or mercury compounds; and b) Establish and strengthen, as appropriate, the institutional and health professional capacities for the prevention, diagnosis, treatment and monitoring of health risks related to the exposure to mercury and mercury compounds

Chapter 5 : Existing Environmental Condition

5.1 Physical Environment

5.1.1 Topography

Topographically, Palpa district has a hilly terrain land and lies in moderate climatic zone of Nepal, with an area of about 1,373 Km² out of which Tansen Municipality covers an area of 109.80 Km² (CBS, 2011). The municipality is located on the highway between Butwal and Pokhara, on the crest of the Mahabharat range or Lesser Himalaya overlooking the valley of the Kaligandaki River to the north. The UMHT site is located at 27°57'00"N Latitude and 83°53'00"E Longitude. The altitude variation of the hospital site is 1350 m above mean sea level.

5.1.2 Physiographic and Soil Type

The project lies in middle Mountain Region. The project site and its surrounding is made up of sand silt and clay layers and represents the alluvial belt of greater Ganga basin. The lithological formations are termed as Gangatic Alluvium. Structurally the region is stable and shows no major faults in the municipality. The project site soil comprises of sand, silt, and clay with the absence of gravel sized particle. The project site comprises of granular and cohesive soil type.

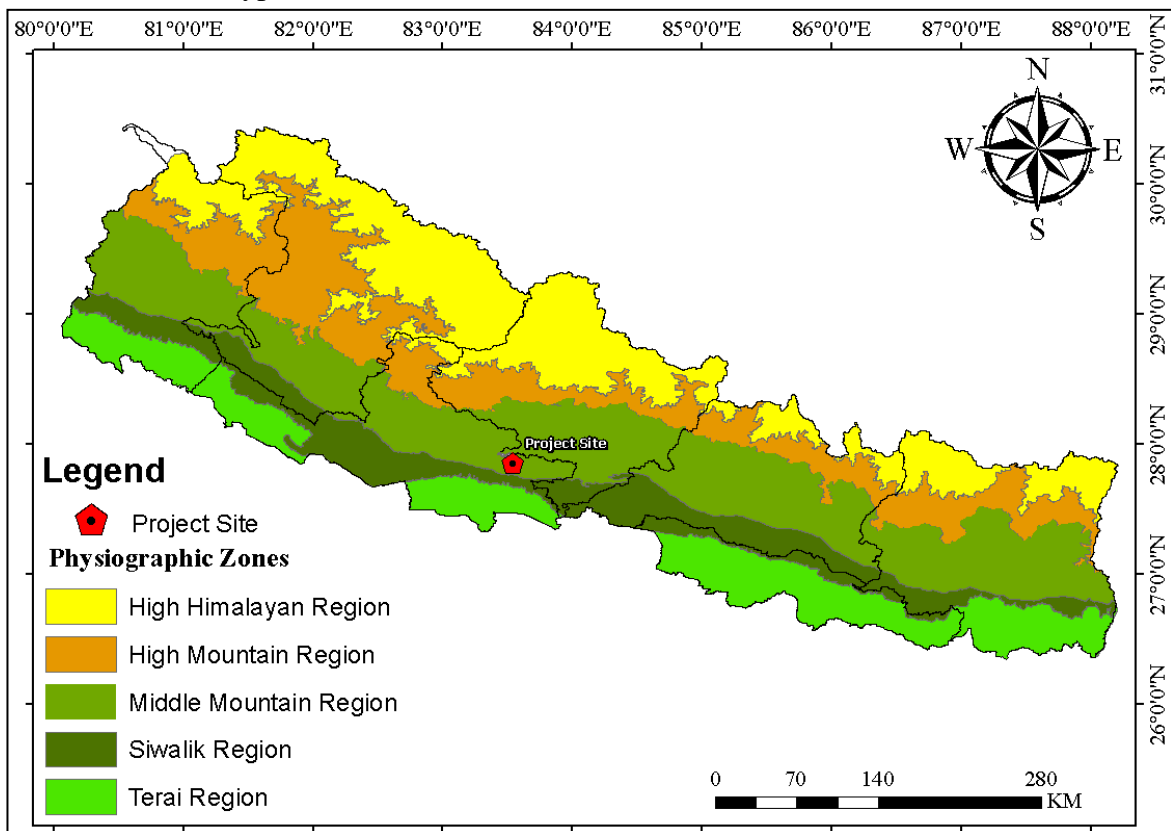


Figure 5-1: Geological Map of Nepal
(Source: GIS mapping, 2022)

5.1.3 Climate

The Project area consists of moderate climate. Being located in the hilly land of Nepal, the temperature of Tansen is usually ranges from 4°C (39.2 °F) to 30°C (86 °F). The average temperature reaches high up to 35.05⁰C and low average temperature is 8.55⁰C

5.1.4 Land Use Pattern

Tansen municipality covers an area of approximately 109.80 Km². Because of the overall infrastructure facilities and the rapid population growth, the land use pattern of the Tansen bazaar is changing year by year. Palpa district is renowned for one of the best tourist destination. Hospital site is located at the semi urban area of Municipality ward No 1. The hospital vicinity site is occupied by settlement area and agricultural land. The aerial view of the hospital area is shown in map below.

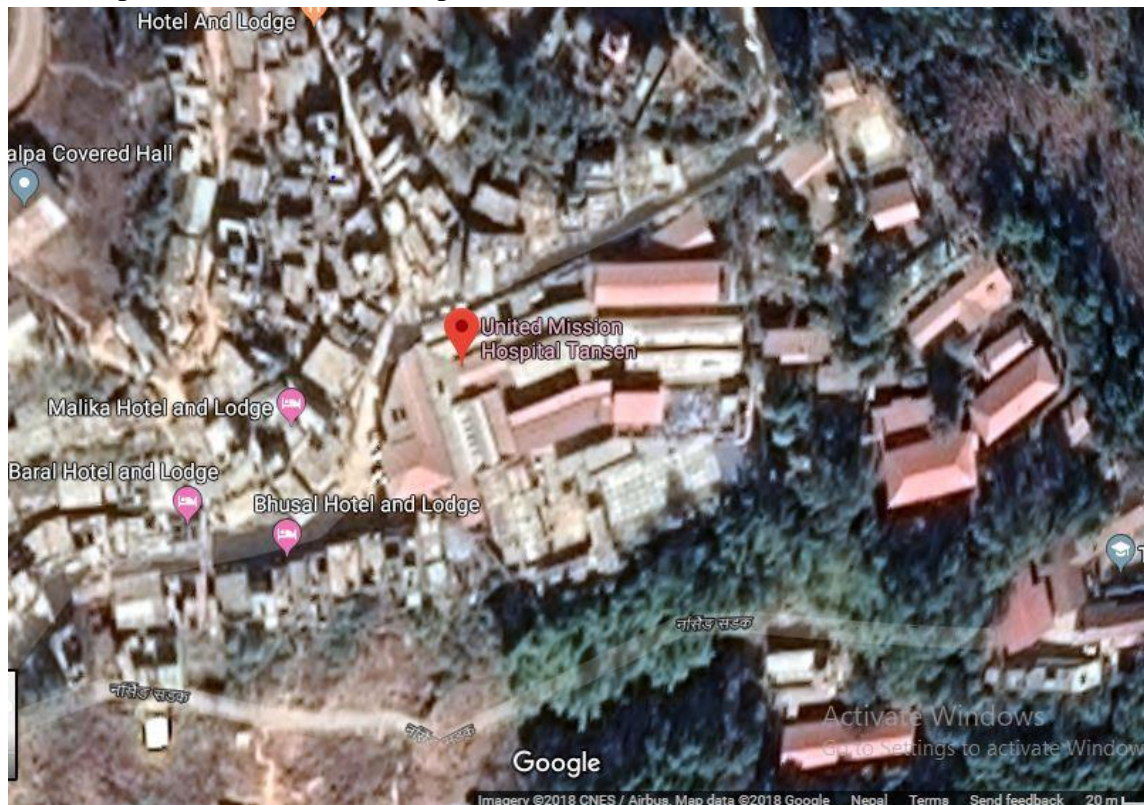


Figure 5-2: Location map of United Mission Hospital Tansen (Source: Google map)

5.1.5 Noise and Air Quality

Noise level was measured in different unit of the hospital area using sound meter in during field visit. The recorded noise data are shown in below table no. 5-1.

Table 5-1: Data Collected by Sound Level Meter at Different Sites

SN	Sound Measurement area	Sound level (decibel dB)	date	Time (PM)
1	Parking area	57.46	2078/05/30	2:15–2:45
2	Main Gate Area	62.4	2078/05/30	2:50–3:20
3	Incinerator area	56	2078/05/30	3:25–3:55
4	Ward Area	54	2078/05/30	4:00–4:30

Source: Field visit, 2021



Plate 5-1: Measuring sound level using noise level meter

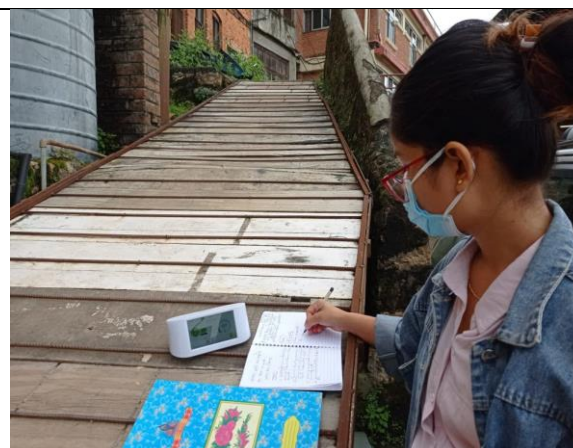


Plate 5-2: Measuring air quality using air visual pro

Similarly, Air quality was also measured during the field visit. The air quality was measured by using Air visual Pro. The recorded PM_{2.5} air quality value was found to be less than National Ambient Air Quality Standard 2012. That means the air quality of project area is found to be good condition. The recorded PM_{2.5}, PM₁₀ values are shown in table no.5.2.

Table 5-2: Air Quality Data at Different Sites

S.N	Parameters	Main gate area	Parking lot area (pm _{2.5})	NAAQS, 2012 value
1.	AQI	38	35	PM ₁₀ -120 µg/m ³ PM _{2.5} -40µg/m ³
2.	Temperature	23.2°C	23.7°C	
3.	PM ₁₀	100 µg/m ³	110 µg/m ³	
4.	PM _{2.5}	30 µg/m ³	35 µg/m ³	
5.	Humidity	99%	91%	

Source: Field visit, 2021

5.1.6 Water Availability

The water required by hospital is to be used from spring water and municipality pipeline. For the purification of water, water will be treated and filtered and then distributed to whole the hospital compound. The water quality test report is shown in table 5-3.

Table 5-3: Water Quality Test Report of United Mission Hospital, Tansen

S.N	Parameters	Test Methods	Observed Values	NDWQS, 2062
1	pH at 24 °C	Electricity, 4500-H ⁺ B,: APHA	7.2	6.5-8.5
2	Electrical Conductivity, (µS/cm)	Conductivity Meter,2510 B, APHA	116	1500
3	Turbidity (NTU)	Nephelometric, 2130 B, APHA	1	5
4	Total Hardness as CaCO ₃ (mg/L)	EDTA Titrimetric,2340 C, APHA	66	500
5	Total Alkalinity as CaCO ₃ (mg/L)	Titrimetric,2320 B, APHA	75	-
6	Chloride ,(mg/L)	Argentometric Titration , 4500-	2.89	250

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		Cl ⁻ B, APHA		
7	Ammonia, (mg/L)	Direct Nesslerization, 4500-NH ₃ C APHA	<0.05	1.5
8	Nitrate , (mg/L)	UV Spectrophotometric Screening 4500- NH ₃ ⁻ B, APHA	1.77	50
9	Nitrite , (mg/L)	NEDA, colorimetric, 4500-NO ₂ ⁻ B, APHA	<0.02	-
10	Calcium, (mg/L)	EDTA Titrimetric, 3500-Ca B& 3500 -Mg B APHA	14.40	200
11	Magnesium, (mg/L)		7.29	-
12	Iron, (mg/L)	Direct Air-Acetylene AAS, 3111 B, APHA	0.08	0.3
13	Manganese		<0.02	0.2

Source: Nepal Environmental and Scientific services (P.) Ltd

5.1.7 Drainage System

There is no municipality drainage system nearby project so the hospital has septic tanks for management toilets waste and liquid waste. Hospital will built waste water treatment for the proper management of liquid waste.

5.1.8 Seismicity

According to Nepal National Building Code 2077, the seismic zoning factor (Z) represents the peak ground acceleration (PDA) for 475 year return period. The seismic zoning factor (Z) of Tansen Municipality Z= 0.35 and the peak ground acceleration for 475 year return period.

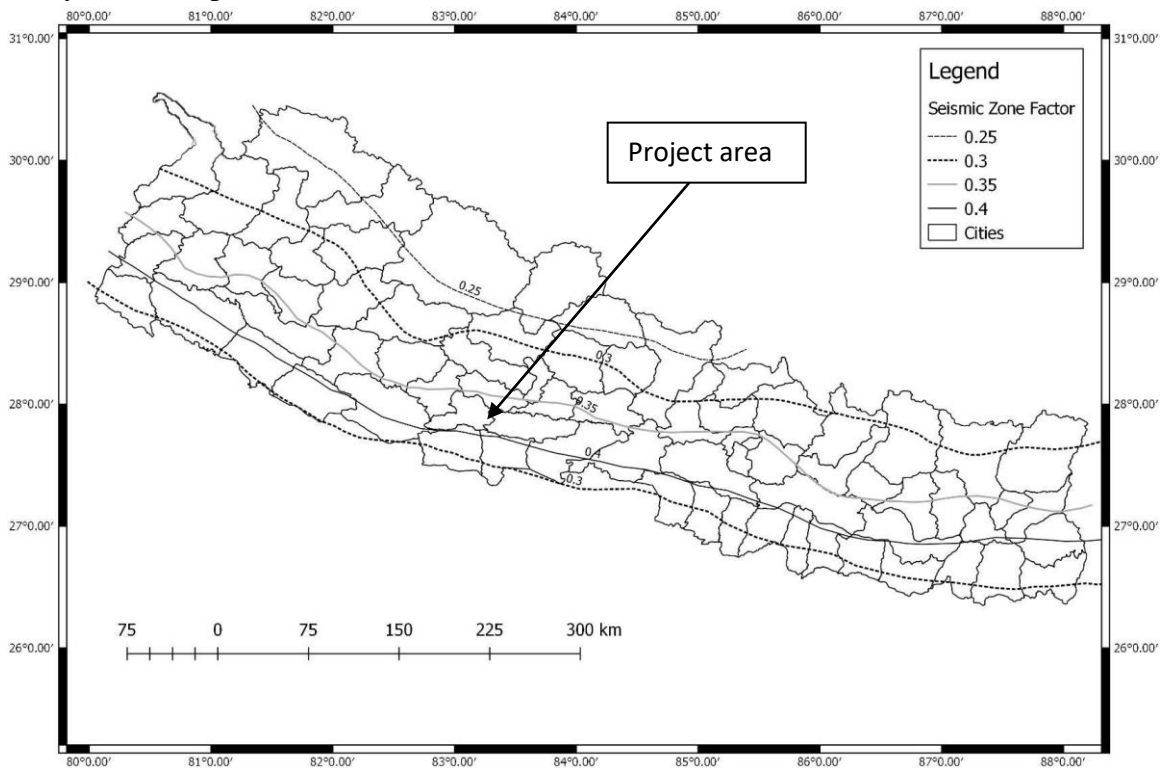


Figure 5-3: Seismic Zoning Mapping of Nepal

(Source: Seismic Hazard Mapping and Risk Assessment for Nepal)

5.2 Biological Environment

5.2.1 Vegetation

The hospital site does not contain any endemic or endangered floral species in its territory; however many tree species have been planted all around hospital premises. The remarkable species of flora and tree species existing in the surroundings is shown in the table 5-4.

Table 5-4: Tree species in the project area

1. Chilaune (<i>Schima walichii</i>)	2. Avagadro (<i>Persea Americana</i>)
3. Bamboo (<i>Bambus oideae</i>)	4. Dhupi (<i>Juniperus sps</i>)
5. Salla (<i>Pinus roxbourgii</i>)	6. Walnut (<i>Juglans sps</i>)

5.2.2 Wildlife

There are no any protected wildlife species noticed in hospital site and its vicinity. However, according to the local people wild animals like Nyauri Muso (*Herpestes edwardsii*), Syaal (*Canis aurieus*), Musa (*Rattus tanezumi*), Reptiles like Common Oriental Garden Lizard (*Calotes versicolor*), Amphibians like Frog (*Rana taipehensis*) and Indian burrowing frog (*Sphaerothecabreviceps*) are occasionally observed. The dominant species observed around the project area are bird species, Sparrow (*Passer domesticus*), Pigeon (*Columba leuconota*), Crow (*Corvus splendens*), Dhukur (*Streptopelia chinensis*), Dangre (*Acridotherres sp.*), Chibe (*Dicrurusaeneus*) etc.

5.3 Socio-Economic and Cultural Environment

According to National Population Census 2011, the total Population of Palpa district is 261,180 in which male and female populations are 115,840 and 145,340 respectively. The average household of the Palpa district is 4.41 and sex ratio is 79.70. Similarly, the population density is found to be 190.23. The detail of the demographic characteristics of Palpa district and Tanen municipality and project affected ward is given table no 5-5.

Table 5-5: Demography of Palpa District, Tansen Municipality and Project affected Area

S. N.	Particulars	Description			Remarks
		Palpa District	Tansen Municipality	Ward no. 1	
1	Total Area	1,373 km ²	109.80 km ²	3.47 km ²	
2	Demographic Features				Source: Tansen Municipality Profile 2072
	Total Households	59,291	8,411	1916	
	Total Population	261,180	29,095	6451	
	Male	115,840	13,742	3075	
	Female	145,340	15,353	3376	
3	Average House Size (person/HH)	4.41	3.46		
4	Sex Ratio	79.70	89.51		
5	Population density	190.23	264.98		

5.3.1 Caste and Religion

According to CBS 2011, the major ethnic groups in the Tansen Municipality are Brahman Hill (26.12%), Chhetree (16.28%), Magar (29.25 %), Newar (10.83 %) Kami (5.58 %), Thakuri (1.12 %), Sarki (2.05%), Gurung (0.51%) and other (8.26%) Similarly, the most of the people follow Hinduism as a religion. 80.00% of the total population follow Hinduism, 12.89% of population follow Buddhist, 5.25% of population follow Christian, 1.23% of population follow Muslim and remaining 0.64% of population follow other religions.

Table 5-6: Caste and Ethnic composition in Tansen Municipality

SN	Caste and Ethnicity	Percentage
1	Brahman Hill	26.12
2	Chhetree	16.28
3	Magar	29.25
4	Newar	10.83
5	Kami	5.58
6	Thakuri	1.12
7	Sarki	2.05
8	Gurung	0.51
9	Other	8.26

Source: National Population and Housing Census, 2011

5.3.2 Occupation

Agriculture and livestock is main occupation followed by people in Tansen Municipality so it is taken as dominant occupation, beside this people of Tansen municipality are involving in Trades and business. Local Newar are involving in making traditional metal vessel and Dhaka cloth used in traditional jacket and topies. People are also involved in labour, government and non-government organization work, small industry. United Mission Hospital Tansen has been playing vital role in providing employment opportunity to the people and also helps to increase the economic activity and economic status of the people in the project area.

5.3.3 Health and Sanitation

According to District Public Health office, major health problems associated with local people are common cold, typhoid, diarrhea, respiratory diseases, gastro-intestinal diseases, mal nutrition, water borne diseases and many others. In context with the status of sanitation in Municipality major households have flush toilets as well as ordinary toilets. Being a municipality, it does not have sanitary landfill site so lacks proper sewerage treatment facility.

5.3.4 Public Services and facilities

5.3.4.1 Education

The literacy rate of the Tansen Municipality is 87.81% with male literacy at 93.22% and female rate is 83.09% (CBS, 2011). During field visit, it was noticed project site people are conscious on importance of education and enrollment of younger generation for further studies have been noticed and literature review shows increasing trend of education

attainment in Tansen Municipality. Shree Mahendra Bodhi Higher secondary School is located nearby project area



Figure 5-4: Shree Mahendra Bodhi Higher secondary School near project area

5.3.4.2 Health Facility

Lumbini Medical College is the main medical college located 8.5 km far from UMHT hospital. Beside this few polyclinics and health centers are also present in municipality. Lion Lacoul eye Hospital and District Ayurvedic hospital are also situated near to the United Mission Hospital Tansen. Palpa District Hospital is situated 2 km far from the United Mission Hospital Tansen. Similarly, The Public Health Care Centre is located 1 km far the UMHT.

5.3.4.3 Communication

Communication facilities are available in Tansen municipality and more in progress. Mobile phones and internet services are in use more and more every day. Project site is connected with every form of communication services. Number of radio stations, print magazines and courier services are also available in the city.

5.3.4.4 Electricity

Almost all the residents nearby hospital area are connected with electricity line. Due to load shedding/electricity scarcity back up facilities of Inverters, UPS and Generators were also observed in many households during field study.

5.3.4.5 Existing Roads and Traffic situation

The project site is assessed with black topped roads without any disturbances. The traffic police are frequently deployed in the highway as well as in hospital surroundings area.

5.3.4.6 Settlement area near UMN Tansen Hospital

The main project affected settlements area are Bhusaldada, Pragatishil tole and Pani Tanki area.

Table 5-7: Settlement near to the Hospital

Name of the Settlements	Distance from UMH Tansen Hospital boundary	Total Households
Bhusaldada	25 m	100
Pragatishil Tole	200 m	30
Pani Tanki	250 m	-

Source: Field Visit, 2020

5.3.5 Religious and Cultural Site

Tansen Church and Bishswor Mahadev temple are located nearby hospital. The distance between project area and some religious sites are given in table no. 5-8.



Plate 5-3: Tansen church near to hospital



Plate 5-4: Bishswor Mahadev Temple located near the hospital

Table 5-8: Religious and Cultural Site

SN.	Religion and Cultural Site	Distance from UMHT
1.	Shree Amar Narayan Temple	3.3 km
2.	Ganesh Mandir	1.5 km
3.	Bhairav Temple	11.4km
4.	Darlam Mahakali Temple	10.8 km
5.	Mahamrityunjaya Shivasan, Barangdi	5.8 km

Source: Field Visit 2021

5.3.6 Religious practice

People of project area celebrate Dashain, Tihar, Ram Navami, Holi, Christmas, Maghesangrati, Shivaratri etc.

Chapter 6 : Alternative Analysis

The Government of Nepal has emphasized on ensuring universal access to the health related fundamental rights and quality health care of the Nepali citizens as provided by the constitution through the health system in accordance with the federal structure. In line with the concept of universal access to health, there is a strategy to develop and expand promotional, remedial, therapeutic, rehabilitation and administrative services in an integrated manner.

For that reason, this option has been studied within the concept of implementing the proposal when there is no other option but to implement the proposal. While implementing the proposal, the options including the following areas have been analyzed.

- a) Design
- b) Project Location
- c) Technology, Procedure of Operation, Time Schedule
- d) Raw Materials to be used
- e) Environmental management Plan

The different alternatives of the project are shown in table 6-1.

Table 6-1: Alternative analysis of Project

Alternative	Analysis	Beneficial Environmental Impacts	Adverse Environmental Impacts
No Project Alternative	The comparison of various considered project alternatives showed that the project will not cause severe adverse environmental impacts if appropriate mitigation and monitoring measures identified are implemented in the project design and implementation. Therefore, in order to support the government’s objectives of increasing health service facilities in the nation, the proponent have decided to implement the proposal. Implementation of this alternative will avert the project due to which the country steps back in the improvement of health and education sectors. This will cut	<ul style="list-style-type: none"> • Health care services access to Tansen municipality and Palpa district. 	<ul style="list-style-type: none"> • Population growth in particular area.

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	off all opportunities of health services in the project running area as well as effect in the production of significant number of qualified and skilled personnel in the field of health care services.		
Project Location	UMHT is located at Ward no.1 of Tansen Municipality in Palpa District Nepal. Realizing the need of advanced healthcare institution in Palpa district and to provide quality health for the patients, the United Mission Hospital Tansen is planning to upgrade its 169 bed capacity to 200 bed capacities. Since the project is in operation phase so there are no alternatives of project location	<ul style="list-style-type: none"> • Additional health services will provide to people 	<ul style="list-style-type: none"> • Population growth in particular area. • Traffic congestion
Technology, Procedure of Operation, Time Schedule	<ul style="list-style-type: none"> • This hospital is aimed at providing medical services using the Best Available Technology (BAT). • The hospital has also planned to upgrade and improve the technology with time and according to the demand of the people. • The hospital will gradually follow up new and modernized technology regarding diagnosis. • Hospital has phase out mercury-associated equipment. • Instead of using mercury associated thermometer and Sphygmomanometers, digital thermometers and mercury free sphygmomanometers, 	Access to health Care	No

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	mercury free dentistry have been considered for the hospital.		
Raw Materials to be used	<ul style="list-style-type: none"> The hospital is already constructed so raw materials will not necessary 	No	No
Environmental Management Plan	<ul style="list-style-type: none"> Health care waste is treated by using autoclave before sending to the disposal area The pathological wastes like body part, tissue are disposed in biopit and Placenta is disposed in placenta pit. The waste which can be burnt is sent to the incinerator. Expired medicines are returned back to the production company and only mercury free equipment will be used. The radiological waste will store in close room with applying safety measures and training related with occupation health safety will be provided to the health worker including waste worker of hospital Waste water generated from hospital will be treated using waste water treatment plant. Solar energy is used for alternative energy sources. Recharge pit will be constructed for recharging ground water. Rain water harvesting method is adopted for fulfillment of daily water demand in hospital 	Help to maintain clean environment	No

Chapter 7 : Impact on Environment due to implementation of Proposal

The hospital building is already constructed so only operation phase impacts are considered. The identified beneficial and adverse environmental impacts are given below;

7.1 Operation Phase

7.1.1 Beneficial Impacts

7.1.1.1 Increase in local economic activities

With the operation of the hospital, economic activities will be increased around the hospital. Daily activities of the local will be increased and demand of local goods, markets, food and other basic requirement certainly increase in the project site. Large number of visitors, patients and other staffs will significantly increase in the economic transaction in and around the project area. This will increase in the local economy and lead to the urbanization of the area and will improve the socio-economic status of the local people. With the operation of hospital, the trade and business activities may increase significantly in the around the hospital area, more medical stores, groceries or commodity stores will start their business. The number of suppliers supplying various hospitals related items and other different commodities will be increased. *The envisaged impact is indirect in nature, low in magnitude, local in extent and long term in duration so this impact is significant*

7.1.1.2 Employment opportunity to local people

During the operation period of hospital large numbers of medical professionals and other staffs are involved to run the hospital and to provide the medical services to the patient. This will provide the opportunities to a large number of qualified medical professionals. Besides that, the hospital not only provides the medical facilities to the patients but also provide huge opportunities to the students for the training practices. *The envisaged impact is direct in nature, high in magnitude, regional in extent, long term in duration so this impact is very significant.*

7.1.1.3 Health care opportunities for local people and outsiders

Health facilities will be accessible for the local people as well as for the people from entire district and nearby settlement after the completion of the project. The hospital with 150-bedded will provide different medical facilities and opportunities in affordable cost. Hence, the hospital will improve the health conditions and well-being of the people and add a mile stone in the development of health sector of the nation. *The envisaged impact is direct in nature, high in magnitude, regional in extent, long term in duration so this impact is highly significant.*

7.1.1.4 Skill Enhancement

The work force gets opportunity to work with new technologies and equipment so that their level of skill will upgrade. This will be a positive point to the employees for their future works. Idea and skill generated for once can be used for similar nature of projects in future. *The envisaged impact is direct in nature, medium in magnitude, local in extent, long term in duration so this impact is significant.*

7.1.1.5 Community support program as per Corporate Social Responsibility (CSR)

United Mission Hospital Tansen will support various community programs based on public interest. It will organize different welfare programs for the well-being of the society to minimize the effect of the hospital to the possible extent. Furthermore, the United Mission Hospital Tansen would also take full responsibility for the any kind of adverse impact of its activities on the environment, communities, stakeholders and all other members of the society. *The envisaged impact is indirect in nature, low in magnitude, local in extent, short term in duration hence this impact is insignificant.*

7.1.1.6 Local area development

With the operation hospital, the land value in the surrounding of hospital is predicted to go up rapidly with the increase in economic activities in the area. This will benefit the local people and help to improve their socio-economic status. *The envisaged impact is direct in nature, high in magnitude, local in extent, long term in duration hence this impact is very significant.*

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Table 7-1: Evaluation of Beneficial Impacts

Issues	Impacts	Environmental Impacts				Total Score	Significance of impacts
		Nature	Magnitude	Extent	Duration		
Operation Phase							
Increase in local economic activities	Increase in the local economy and lead to the urbanization of the area. Large number of visitors, patients and other staffs will significantly increase in the economic transaction in and around the project area	IN	L(10)	Lo(20)	LT(20)	50	Significant
Employment opportunity to locals	Large numbers of medical professionals and other staffs are involved to run the hospital and to provide the medical services to the patient.	D	H(60)	R(60)	LT(20)	140	Very Significant
Health care opportunities for local people and outsiders	accessible for the local people as well as for the people from entire district and nearby settlement after the completion of the project	D	H(60)	R(60)	LT(20)	140	Very Significant
Skill Enhancement	gets opportunity to work with new technologies and equipment so that their level of skill will upgrade	D	M(20)	Lo(20)	LT(20)	60	Significant
Community support program as per Corporate Social Responsibility (CSR)	Hospital will support various community programs based on public interest	D	M(20)	Lo(20)	LT(20)	60	Significant

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Local area development	The land value in the surrounding of hospital is predicted to go up rapidly with the increase in economic activities in the area.	D	H(60)	Lo (20)	LT(20)	100	Very Significant
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7.1.2 Adverse Impacts

7.1.2.1 Physical and Chemical Environment

7.1.2.1.1 Impact due to healthcare waste generation

Medical care is vital for our life, health and well-being. Simultaneously the waste generated from medical activities can be hazardous, toxic and even lethal because of their high potential for diseases transmission. The hazardous and toxic parts of waste from hospital complex comprise of infectious, biomedical, human tissues and radioactive material as well as sharps (needles, knives, scalpels, etc). They constitute a serious risk to public health and environment if these are not properly disposed or are allowed to get mixed with other municipal waste. Moreover, the liquid waste from hospital ward, kitchen, and toilet may pose great threat to community health if the sewer system is not well maintained. *The envisaged impact is direct in nature, high in magnitude, site specific in extent, long term in duration so this impact is very significant.*

7.1.2.1.2 Impact due to waste water generation

The waste water and semi-liquid waste are generated during the operation of the hospital. There are mainly infectious wastewater generated from laboratories, Operation Theatre, X-ray department and disinfection and cleaning; and other the organic wastewater generated from toilet, kitchen, bathroom etc. The wastewater coming from above place should be managed in proper way. *The envisaged impact is indirect in nature, medium in magnitude, Local in extent and long-term in duration, thus this impact is significant.*

7.1.2.1.3 Impact due to air pollution

The main source of smoke or flume gas and air pollutants is from the operation of the generators. Operation of generator is needed during load shedding period only. Besides the vehicular emissions would also have contribution to the air pollution. The operation phase of the hospital release any major air pollutant generating sources except vehicular movement compared to construction phase. Beside that operation of generators, smell from hospital waste will also pollute the surrounding atmosphere. The hazardous gaseous are produced while the medical waste are burned. Dioxin Furunce, HCl, NO_x, SO_x etc. are the gaseous which cause the different types of disease. *The envisaged impact is direct in nature, moderate in magnitude, local in extent, long term in duration hence this impact is significant.*

7.1.2.1.4 Impact due to noise pollution

The main source of the noise during the operation of hospital is the movement of vehicles and operation of the standby generators. After the construction of the project, the inflow of people will comparatively increase in the area. Along with that the rate of traffic density increases contributing to high noise level. Beside that the operation of generators will be the source of noise. *The envisaged impact direct in nature, local in extent, low in magnitude, Local in extent, long term in duration so significant impact*

7.1.2.1.5 Impact due to water pollution

Hospital generates large amount of liquid waste, which if not treated well it will get mixed indirectly to the river water and pollute the river water. *The envisaged impact is direct in nature, medium in magnitude, local in extent, long term in duration and significant.*

7.1.2.1.6 Issues regarding possible burning of hospital wastes

Hospital generates lots of wastes which can be combustible as well as non-combustible. When the combustible wastes are burned in the incinerator and large amount of PoPs are generated which may create air pollution as well as cause health problems in the staffs and people who are living near to the hospital. *The envisaged impact is direct in nature, moderate in magnitude, local in extent, long term duration and significant.*

7.1.2.1.7 Energy fulfillment for the hospital operation

Almost all the residents nearby hospital area are connected with electricity line. Due to load shedding/electricity scarcity back up facilities of Inverters, UPS and Generators were also observed. In hospital, there are 3 units of diesel generators of total capacity of 675KVA for round the clock power backup. During the operation phase, hospital takes sometimes high load of current and electricity so that it causes load shedding problems several times in a week in the project affected area. *The envisaged impact is indirect in nature, low in magnitude, site specific in extent, long term in duration thus this impact is insignificant.*

7.1.2.1.8 Storm water management

The hospital building, roads, parking, rooftops and other surfaces that prevent water from soaking into the ground greatly increases the runoff volume created during storms. If this storm water is not properly managed, there may create a great problem to the pedestrians around the hospital area. *The envisaged impact is indirect in nature, low in magnitude, site specific and long term in duration, so the impact is Insignificant.*

7.1.2.1.9 Issue of disaster risk reduction (Earthquake, fire hazards, lightning, electrocution) in hospital

The hospital building poses a high risk of hazards like earthquake, fire hazard, lightning etc. comparatively. The possibility of loss of lives and properties is higher due to large project structure. Thus, the disaster mitigation and preparedness holds a high significance. Earthquake and fire safety have been the prime concern of the proponent from the point of disaster management. The proponent has design procedures to identify potential emergency conditions and response to disaster state. Hospital buildings have been designed as earthquake resistant and installation of emergency safety instruments and alarms in the buildings maintained. *The envisaged impact is indirect in nature, low in magnitude, local in extent, short term in duration hence this impact is insignificant.*

7.1.2.1.10 Radiation Hazard from radiological equipments

The main source of radiological wastes is X-ray machine, MRI machines and ECG machines and by-product of the photochemical liquids. Use of X-rays machines in the

hospital is the source of radiation and useless of machines after broken and damages make it as a waste. The ratio active waste contains radioactive particles that emit radiation with high energy electromagnetic radiation, such as gamma rays. This quality makes the materials dangerous. People and other parts of nature exposed to this radiation can suffer serious long –term damage. *The envisaged impact is direct in nature, high in magnitude, site specific in extent and long term in duration so this impact is very significant.*

7.1.2.1.11 Chemical and heavy metal wastes

Different types of chemical wastes will be generated by hospital. If these infectious chemical wastes are not properly managed, that will cause the serious problems in the local area and the labours Hospital. The equipments, with contain mercury are the mainly used in the hospital and we all know that mercury is the heavy metal, cause many craniological diseases and kidney problems if we continuously expose on it. *The envisaged impact is indirect in nature, high in magnitude, local in extent and long term in duration hence this impact is very significant*

7.1.2.1.12 Management of expired medicine

During the project operation stage, hospital is likely to generate large amounts of hazardous solid medical waste (used cotton and bandages, tested medical specimens, expired drugs, etc.) and soil contamination due to accidental chemical and oil spills. The waste water released from hospital is major chemical concern during operation period of hospital. *The envisaged impact is indirect in nature, low in magnitude, site specific in extent and long term in duration so this impact is insignificant.*

7.1.2.1.13 Chemical use in X-ray and lab

Different types of chemical wastes will be generated by hospital. If these infectious chemical wastes are not properly managed, that will cause the serious problems in the local area and the labours Hospital. The equipments, with contain mercury are the mainly used in the hospital and we all know that mercury is the heavy metal, cause many craniological diseases and kidney problems if we continuously expose on it. *The envisaged impact is indirect in nature, high in magnitude, local in extent and long term in duration hence this impact is very significant*

7.1.2.2 Biological Environment

7.1.2.2.1 Greenery maintenance and protection

The project area lies in the private land. An open space of about 2013.896 m² has been separated to get fresh air for the patients. Similarly, 1,367.437 m² has been allocated for the gardening purpose. *This is direct impact in nature, low in magnitude, site specific in extent and long term in duration hence this impact is very significant*

7.1.2.3 Socio-economic and Cultural Environment

7.1.2.3.1 Occupational health and safety of the workers

The health and safety of hospital staff and patients in the hospital are a prime concern and top priority of the hospital management. During the operation of the project, different human resources from different occupation get involved. Some workers may be exposed

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to hazardous materials, which may have temporary or permanent effect. If appropriate precautions are not taken then serious mishap may occur. The high exposure to hazardous materials like paints, grease, dust etc. may add risk to employees. Respiratory problems like ARTIs, COPDs, heart diseases, hearing disorders, different epidemics may be common to those workers exposing highly to hazardous waste. *The envisaged impact is direct in nature, high in magnitude; local in extent, long- term in duration thus this impact is very significant*

7.1.2.3.2 Food safety issues for patient, visitors and staffs

Hospital canteen supplies the food for all patients and visitors. If the canteen does not serve hygienic food, it will create big issue. The junk food and the packet food are not good for health but still staff and visitor use to eat such food sitting in the ward. These activities may disturb the ward peacefulness. *The envisaged impact is direct in nature, low in magnitude, site specific in extent, long term in duration thus this impact is insignificant.*

7.1.2.3.3 Health and sanitation in and around the vicinity

The hospital management committee is likely to receive the grievances from the local community during the operation phase. Different discussions and confusions may arise during the operation of the hospital. Complaints related to impacts, demands, services, financial support for the community development are the main concern of grievance management. *The envisaged impact is direct in nature, low in magnitude, site specific in extent, long term in duration thus this impact insignificant.*

7.1.2.3.4 Issues of Grievances

With project operation, relative increase in the population increases the demand of basic needs like food, drinking water, security, energy etc. There may be shortage of these basic things to feed the large population. The hospital management committee is likely to receive the grievances from the local community during the operation phase. Different discussions and confusions may arise during the operation of the hospital. Complaints related to impacts, demands, services, financial support for the community development are the main concern of grievance management. And moreover, increase in the population density of the site may lead to different social or cultural disputes among them. The hospital is doing camping to the locality. Locals nearby the college also demand for free health check services and discount on different health check facilities to the locals. *The envisaged impact is direct in nature, low in magnitude, local in extent and long- term in duration hence this impact is significant*

7.1.2.3.5 Law and order situation

The hospital management committee is likely to receive the grievances from the local community during the operation phase. Different discussions and confusions may arise during the operation of the hospital. Complaints related to impacts, demands, services, financial support for the community development are the main concern of grievance management. *The envisaged impact is direct in nature, low in magnitude, local in extent, and Long-term in duration, hence this impact is significant.*

7.1.2.3.6 Impact on Gender and Child

During operation phase, hospital may exploit children and women to work as the labor for their benefit. They may be involved for heavy and risky work at lower salary than the eligibility and male workers. As per conversation with labor, the different in wage of male and female is predominant here. There could arise the possibility of discrimination in wage of male and females in future too. This kind of illegal activity of going against the law should be given high attention. *The envisaged impact is direct in nature, moderate in magnitude, site specific in extent, long term in duration thus this impact is significant.*

7.1.2.3.7 Impact due to Traffic Congestion

Along with the regular operation of the hospital, the influx of people from distant and moving in and out of the hospital will be increased. As the number of vehicles will be increased this may contribute to traffic congestion due to lack of proper parking area. *The envisaged impact is direct in nature, medium in magnitude, site specific in extent and long term in duration hence this impact is significant.*

7.1.2.3.8 Nuisance, disputes and complains

With project operation, relative increase in the population increases the demand of basic needs like food, drinking water, security, energy etc. There may be shortage of these basic things to feed the large population. The hospital management committee is likely to receive the grievances from the local community during the operation phase. Different discussions and confusions may arise during the operation of the hospital. Complaints related to impacts, demands, services, financial support for the community development are the main concern of grievance management. And moreover, increase in the population density of the site may lead to different social or cultural disputes among them. The hospital is doing camping to the locality. Locals nearby the college also demand for free health check services and discount on different health check facilities to the locals. *The envisaged impact is direct in nature, low in magnitude, local in extent and long- term in duration hence this impact is significant*

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Table 7-2: Evaluation of Adverse Impacts

	Issues	Impacts	Environmental Impacts				Total Score	Significance of Impact
			Nature	Magnitude	Extent	Duration		
Operation Phase	Physical and Chemical Environment							
	Healthcare waste management`	Different infectious waste, Pathological waste, radiological waste, sharps glasses, syringes, Pharmaceutical waste and Biodegradable waste generated by healthcare centre and laboratories.	D	H(60)	SS(10)	LT(20)	90	Very Significant
	Waste water management	Waste water produces from operation theater and organic waste water from kitchen and bathroom	ID	M(20)	Lo(20)	LT(20)	60	Significant
	Air Pollution	Toxic gaseous are release during the waste burning that cause health problem in local people	D	M(20)	Lo(20)	LT(20)	60	Significant
	Noise Pollution	Along with that the rate of traffic density increases contributing to high noise level.	D	L(10)	Lo(20)	LT(20)	50	Significant
	Water Pollution	Get mixed indirectly to the river water and pollute the river water	D	M(20)	Lo(20)	LT(20)	60	Significant
	Issues regarding possible burning of hospital wastes	Hospital generates lots of wastes which can be combustible as well as non-combustible. When the combustible wastes are burned in the incinerator and large amount of PoPs are generated which may create air pollution as well as cause health problems in the staffs and people who are living near to the hospital.	D	M(20)	Lo(20)	LT(20)	60	Significant

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Energy fulfillment for the hospital operation	During the operation phase, hospital takes sometimes high load of current and electricity so that it causes load shedding problems several times in a week in the project affected area.	ID	L(10)	SS(10)	LT(20)	40	Insignificant
Storm water management	Other surfaces that prevent water from soaking into the ground greatly increase the runoff volume created during storms. If this storm water is not properly managed, there may create a great problem to the pedestrians around the hospital area.	D	L(10)	SS(10)	LT(20)	40	Insignificant
Impact due to disaster (Earthquake, fire hazards, lightning, electrocution) in hospital	Loss of lives and properties due to different probable disasters in future like fire hazard, earthquake etc.	D	L(10)	Lo(20)	ST(05)	35	Insignificant
Radiation Hazard from radiological equipment's	X-rays may cause cancer in the human body if it is penetrated frequently	D	H(60)	SS(10)	LT(20)	90	Very Significant
Chemical and heavy metal wastes	Chemicals and heavy metal wastes and effluent are not properly handled, managed and disposed, it may adversely affect the environment	D	H(60)	Lo(20)	LT(20)	100	Very Significant
Management of expired medicine	Soil contamination due to accidental chemical and oil spills. The waste water released from hospital is major chemical concern during operation period of hospital.	D	L(10)	SS(10)	LT(20)	40	Insignificant
Chemical use in X-ray and lab	If these infectious chemical wastes are not properly managed, that will cause the serious problems in the local area and the labours Hospital.	ID	H(60)	L(20)	LT(20)	100	Very Significant
Biological Environment							

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Impact on urban biodiversity	availability of fresh air	D	L(10)	SS(10)	LT(20)	40	Insignificant
Socio Economic Environment							
Occupational Health and safety of the workers	Some workers may be exposed to hazardous materials, which may have temporary or permanent effect.	D	H(60)	Lo(20)	LT(20)	100	Very Significant
Food safety issues for patients, visitors and staffs	Junk food and the non-hygienic food use by staff and the visitors affect the internal environment of the ward	D	L(10)	SS(10)	LT(20)	40	Insignificant
Health and sanitation in and around the vicinity	Degradation of environmental and sanitation condition	D	L(10)	SS(10)	LT(20)	40	Insignificant
Impact of Grievances	Probability of increase of conflicts due to centralization of people from different ethnic groups. Increase in local complains and conflicts due to poor management of hospital wastes and others	D	L(10)	Lo(20)	LT(20)	50	Significant
Law and order situation	Unpleasant situation duet to unavoidable circumstance	D	L(10)	Lo(20)	LT(20)	50	Significant
Impact on Gender and Child	They may be involved for heavy and risky work at lower salary than the eligibility and male workers.	D	M(20)	SS(10)	LT(20)	50	Significant
Impact due to Traffic Congestion	As the number of vehicles will be increased this may contribute to traffic congestion due to lack of proper parking area.	D	M(20)	SS(10)	LT(20)	50	Significant

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Nuisance, disputes and complains	There may be shortage of these basic things to feed the large population. The hospital management committee is likely to receive the grievances from the local community during the operation phase.	D	L(10)	L(20)	LT(20)	50	Significant
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Note: D- Direct ID-Indirect

Scores have been taken from National EIA Guidelines, 1993

Criteria:

- Total scores Significance of**
- Impact**
- <45 Insignificant
- 45 to75 Significant
- >75 Very significant
- Magnitude: High (H) - 60, Medium (M) - 20 and Low (L)- 10
- Extent: Regional (R) - 60, Local (Lo) - 20 and Site specific (SS) – 10
- Duration: Long Term (LT) - 20, Medium Term (MT) - 10 and Short Term (ST)-05

Chapter 8 : Environmental Enhancement and Mitigation Measures

8.1 Enhancement Measures

The following environmental enhancement measures will be implemented during operation phase of hospital.

8.1.1 Operation Phase

8.1.1.1 Health care opportunities

Health care services will be accessible to local people on their door and number of medical doctors, nurses, pharmacists, lab technicians, radiologist, ophthalmologist, physiotherapist etc. will provide quality health services from the hospital every day. To increase and enhance the health services to local people, occasional free health camps will be organized in co-ordination with local people. Different incentives and discount in health services will be given by hospital.

8.1.1.2 Increase in local economy

After upgrading of hospital, business opportunities will be increased in its vicinity. To further improve the local business, UMHT will give more priority to local purchase based on availability of goods. More hotels, shops etc. will be increased after upgrading of hospital.

8.1.1.3 Employment opportunity to local People

Currently more than 40 percent employees are from local area. The proponent will continue this trend for employing locals after upgradation also. To enhance the employment opportunities, UMHT will provide priority to local people based on their qualifications and experiences. During the operation phase, UMHT will provide job opportunities to skilled, semi-skilled and worker.

8.1.1.4 Skill enhancement

During operation phase capacity building training will be provided to human resources involved in hospital. Beside this health and sanitation related training will be provided to local people.

8.1.1.5 Corporate Social Responsibility (CSR) activities

The proponent will coordinate with different local NGOs, CBOs working on health sector for conducting different awareness program for well-being of society and local people. The proponent will coordinate with Tansen Municipality and concerned Ward office for plantation activities and sanitation awareness campaign. Beside this, the proponent will bear its responsibility for the any kind of adverse impact of its activities on the environment, communities and stakeholders. The proponent will also provide financial support to nearby school.

8.1.1.6 Plantation and Green Area Maintenance

UMHT will maintain open space for plantation and gardening. In addition to that, it will also promote the street plantation program nearby hospital area and will conduct

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awareness programs to encourage the local people for tree plantation to maintain the greenery in the local area. More than 1000 plant will be planted along street by coordination with Tansen Municipality.

8.1.2.7 Discount facility to poor, helpless and senior citizen

The hospital will provide 10 percent discount facilities to the poor and helpless people for health services. The poor and helpless people will be benefited through health services.

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Table 8-1: Augmenting measures, responsible agency and cost for beneficial impact

Beneficial Impact	Augmenting Measures	Where to implement	Duration	Costs (NRs.)	Responsible agency
Operation Phase					
Health Care Opportunities for people and whole nation people	<ul style="list-style-type: none"> • Free health camps will conduct • Quality health services will be given to the local people and other people • Discount for the disabled and marginalized poor people 	Around Project area and project affected municipality	Operation phase	5,00,000	Proponent
Increase in Economic Activities	<ul style="list-style-type: none"> • Create appropriate environment to establish medical shops (clinic, pharmacy etc.) 	Around Project area	Operation phase	No additional cost	Proponent
Employment opportunity	<ul style="list-style-type: none"> • Employment opportunities will give to the local people according to their qualification 	Around Project area	Operation phase	No additional cost	Proponent
Skill enhancement	Training Program for Skill Development	Project area	Operation phase	6,00,000	Proponent
Community support program as per Corporate Social Responsibility (CSR)	<ul style="list-style-type: none"> • Women Development Program • Environmental health and sanitation • Community development programs • Skill Development Training Programs 	Around Project area and project affected municipality	Operation phase	5,00,000	Proponent and Local government

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Local area development	<ul style="list-style-type: none"> Land value in the surrounding of hospital is predicted to go up rapidly with the increase in economic activities in the area. 	Around Project area and project affected municipality	Operation phase	No additional cost	Proponent and Local government
Total Enhancement Cost				16,00,000	

8.2 Mitigation Measures

The mitigation measure for all the adverse impacts during operation of hospital are presented below.

8.2.1 Operation Phase

8.2.1.1 Physical and Chemical Environment

8.2.1.1.1 Impact due to healthcare waste generation

The health care waste is an extremely complex waste generated from the operation of hospital which includes all types of infectious waste, pathological waste, radioactive waste, sharps glasses, syringes, biodegradable waste and chemical waste. The waste generated from hospital will be hazardous, toxic and even lethal because of their high potential for diseases transmission. Health care waste is the most critical aspect of any hospital project. Wastes that are potentially infectious will be treated prior to disposal by a number of different technologies that either disinfect or sterilize them. These technologies include steam sterilization (autoclaving), dry heat thermal treatment, chemical disinfection processes among others. Non burning technology will be adopted in hospital. Open burning will be prohibited and incinerator will be not used in hospital in future. The health care waste generated from hospital will be segregated at the point of generation (segregation at hospital bed/ward level). A health care waste management committee will be established in hospital which will take care of detail planning and implementation of health care waste management system in a hospital. Health care waste will be managed by Health Care Waste Management Guidelines, 2014. **Figure 8-1** highlights the flow for managing the health care waste generated during the operation phase.

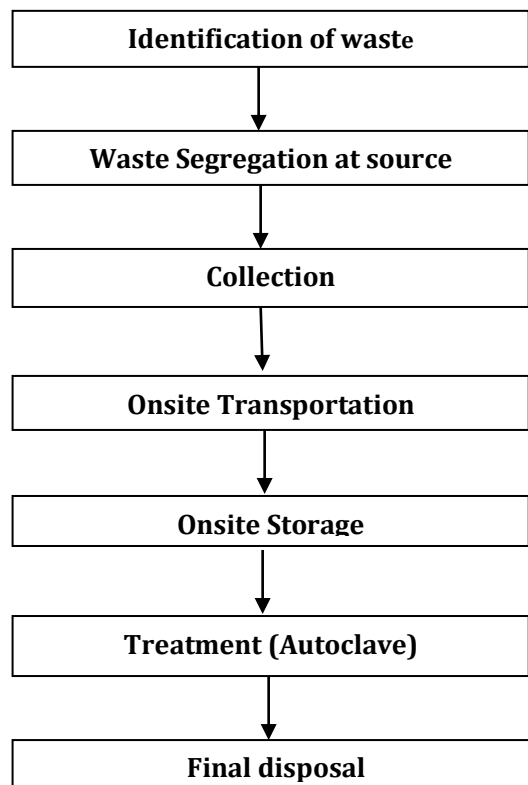


Figure 8-1: Flow Diagram for Health Care Waste Management

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The different categories of healthcare waste generated from hospital are given below;

1. Categories of Healthcare waste

a. General waste

General waste includes wastes that do not carry harmful micro-organism. Examples of general waste include canteen waste, paper waste, boxes and plastic containers used by the hospital.

b. Infectious and Clinical waste

Solid and liquid infectious wastes carry harmful micro-organism and are likely to cause infection among patients. Infectious wastes may be solid wastes, liquid wastes or laboratories wastes which include used dressing, gauze or other items contaminated with blood pus, feces, urine, blood or other fluids; human tissue; body part; specimen collection cups; pathology samples. Pathological waste includes human materials removed during surgery, labour or delivery; autopsy; embalming; or biopsy, including body part and tissues and fetuses; products of spontaneous or induced human abortions, regardless of the period of gestation, including body parts, tissues and fetuses, organs and bulk blood and body fluids. Pathological waste also includes laboratory specimens of blood and tissue after completion of laboratory examination. Sharps include needles, lancets, and hypodermic syringes with attached needles, scalper blades, razor blades, glass pipettes, broken glassware, intravenous spikes, and any other sharp object with the potential to penetrate intact skin.

c. Pharmaceutical and Cytotoxic wastes

Pharmaceutical and cytotoxic wastes include expired, unused, split and contaminated pharmaceutical products, drugs and vaccines that are no longer required and need to be disposed of appropriately. This category of waste also includes discarded items used in the handling of pharmaceutical supplies such as bottles and boxes residues, gloves and masks, connecting tubing and drug vials. Cytotoxic drugs are also known as anti-neoplastic drugs or cancer chemotherapy drugs. Highly these hazardous wastes have mutagenic, estrogenic or carcinogenic properties. Cytotoxin wastes include:






- Cytotoxic drugs (eg. Azathioprine, chlorambucil, cisplatin, 5-fluorouracil, cyclophosphamide, melphalan and methotrexate)
- Vomit, urine or feces from patients treated with Cytotoxic drugs
- Contaminated materials from cytotoxic drug preparation and administration such as syringes and needles, dressing packs gauge vials.

2. Segregation of Healthcare waste





The following color-coding of the containers for different categories of the wastes is given in table 8-2.

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Table 8-2: Color code for the container, labeling and international signs for segregation of HCW

Waste Category, symbol and labeling		Color Code for Container	Examples of wastes
Non-risk HCW	Non-risk waste Biodegradables	Green	Left over stuff foods, gardens, fruits peels, flowers etc.
	Non-risk waste Recyclable 	Dark Blue	Non-biodegradable, which can be recycled: plastic bottles, cans, metals, glass, plastics, papers, rubber etc.
	Other non-risk HCH	Light Blue	Other HCW that do not belong to bio-degradable and recyclable.
HCW requiring special attention	Pathological waste  Danger! Pathological waste	Red	Human body parts, organs, human tissues, removed organs, amputated parts, bone marrow.
	Hazardous Sharps  Danger! Contaminated sharps Do not open	Red	Needles, glass syringes with fixed needles, scalpels, blades, glass, etc. which may cause puncture and cuts.
	Pharmaceuticals	Red	Unused and date expired drugs
	Cytotoxic pharmaceutical waste  Danger! Hazardous Infectious waste	Red	Waste with anti-neoplastic effect such as: alkylated substances, anti-metabolites, antibiotics, plant alkaloids, hormones, etc.
Infectious and Highly infectious waste	Danger! Hazardous Infectious Waste 	Brown	Discarded items contaminated with blood and body fluids from clinically confirmed infected patients including cotton, dressings materials, soiled plaster, linen, bedding, swabs, gloves, syringes without needle, infusion equipment without spike, bandages, other

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			materials contaminated with blood, dialysis equipment, blood from patients infected with HIV, viral hepatitis, brucellosis, respiratory tract secretion from patients infected with TB, anthrax, rabies.
	Danger! Highly infectious waste 	Brown	Waste generated from the microbiological cultures, laboratory waste, such as sputum cultures of TB laboratories, highly concentrated microbiological cultures
Other hazardous waste	Danger! To be discarded by authorized staff only 	Yellow	Waste with high content of heavy metals, such as batteries, pressurized container, organic and inorganic chemicals
Radioactive Waste	Danger! Radioactive waste  Or 	Black	Waste includes solid, liquid and gaseous waste contaminated with radionuclides such as Cobalt, Technetium, Iodine, Iridium, generated from in-vitro analysis of body tissue and fluid, in-vivo body organ imaging and tumor localization

Note: If the container with the recommended color is not available, any colored container can be used to segregate wastes with proper labeling and hazardous sign as shown in the above table.

3. Handling healthcare waste bags

Procedures for handling healthcare waste bags:

1. Check that waste storage bags and containers will be effectively sealed. Bags will be picked up by the neck only. Waste bags will be manually handled as little as possible.
2. Bags will not be held against the body nor should collection staff attempt to carry too many bags at a time.
3. Avoid letting the bags come into contact with the body when being carried. A needle stick is the most likely hazard to endanger the person collecting the waste bag. Hypodermic needles that are not properly segregated into correct sharps container can cause this type of injury.

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4. Sharps have been known to pierce the sides and bottom of polypropylene containers. These containers will be picked up and carried by the handle provided.
5. Avoid puncturing or damaging waste bags, and will not throw or drop them.
6. Ensure that infectious wastes will not mixed, and that bags will store in designed storage areas.
7. Transport all waste bags directly to the designated central storage for disposal.
8. Bags of hazardous healthcare waste and of general waste will not be mixed at any time, but will be segregated throughout handling; hazardous waste will be placed only in specific storage areas.

4. Waste Storage and Transportation Handling

The following provision will be made in the storage and transportation or handling of the wastes:

- Waste will be lifted daily
- Trolleys with wheels will be used for collection and transportation.
- Hazardous waste will be transported safely
- Daily record will be maintained for the hazardous waste
- The persons involved in the collection, storage and transportation of hazardous waste will be provided with Personal Protective Equipment (PPE) such as helmet, goggles, gloves, mask, apron, boot etc.

5. Safe collection and disposal of general waste

General waste does not carry harmful micro-organism. To prevent open piles and scattering of rubbish, bins will be placed in place where they are easily accessible. Signs on general waste containers will be: “General Waste – No contaminated Waste, No Sharps” General tips for safe waste disposal.

- Procedures for disposal of general wastes:
 1. Collect waste in leak –proof bins.
 2. Place bins at convenient locations so that will be used.
 3. Encourage patients to use the bins.
 4. Provide separate containers for non-burnable waste such as bottle and cans.
 5. Wear thick work gloves when handling and transporting waste. This will help to prevent injury.
 6. Collect bins daily or more often if needed and carry to waste area for collection by municipal authorizes.
 7. Clean up all spills immediately with a broom and shovel, and wash the area with soap and water.
 8. Wash all rubbish bins with soap and daily
 9. Wash hands after handing rubbish bins.
 10. Garbage will be removed at least twice daily and no garbage will be left in kitchen areas overnight.

6. Safe collection and disposal of infectious and /or clinical waste

Infectious and /or clinical waste carries harmful micro-organism and can cause infection among patients, staffs or people in the community. Infectious and/or clinical waste is divided into four categories

- Sharps
- Solid clinical waste
- Liquid clinical waste
- Pathological waste

Examples are used dressing, gauze or other items contaminated with blood, pus, faces, urine, blood or body fluids; human tissue; body parts; paper specimen collection cups; pathology samples; needles; scalpel blades.

i) Sharps waste collection and disposal

Procedures for collecting and disposing of sharps:

1. Wear thick work gloves with transporting sharps containers
2. Ensure that the sharps container lid will be closed or sealed with tape before transporting.
3. Collect containers daily, or more often if needed
4. Wash hands after handling sharps containers

ii) Solid clinical waste collection and disposal

Examples of solid clinical waste include used dressing, gauze or other items contaminated with blood, pus, feces or other body fluids; human tissue; body parts; paper specimen collection cups. Proper disposal of solid clinical waste helps to prevent the spread of micro-organisms from contaminated waste to staff, patients and the community. There will be a separate clinical waste bin with a lid. The bin will be lined with a plastic bag and will have no holes. Bins will be labeled “CLINICAL WASTE, NO SHARPS”

1. Place bins in place where they will be used
2. Wear thick gloves when handling and transporting wastes
3. Infectious waste will be sent for autoclaving to make disinfected and pieces of needle store in closed metal box.
4. Clean up all spills immediately with a broom and shovel, and clean area with a neutral detergent.
5. Each day, wash waste bins with soap and waster
6. Wash hands after handling waste bins.

iii. Liquid clinical waste disposal

Examples of liquid clinical waste include blood, urine, feces, pus, sputum, spinal and peritoneal fluids, and pathology specimens. Proper disposal of liquid clinical waste helps to prevent the spread of micro-organisms from contaminated liquid waste to staff, patients and the community. Procedures for the disposal of liquid clinical waste:

1. Wear thick work gloves when handling and transporting wastes.
2. Wear eye goggles to protect eyes from splashing.

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3. Carefully pour blood, urine or other body fluids directly into toilet, utility sink drain.
4. Avoid splashing
5. Rinse the skin or toilet carefully and thoroughly with water.
6. When stool or sputum is collected in paper specimen cups, treat as clinical solid waste.
7. Wash hands after handling liquid waste.

iv. Laboratory waste collection and disposal

Examples of laboratory waste include used culture plates, specimen containers and specimens. The proper disposal of laboratory waste helps to prevent of micro-organisms from microbiology laboratory waste and other specimens to staff, patients and the community. An autoclave or pressure cooker will used to sterilize laboratory waste before disposal into a separate plastic bin with yellow or red plastic bin liner labeled (in black). "BIOHAZARD WASTE". Procedure for disposing of laboratory waste:

1. Autoclave all petri dishes and test tubes that have been to grow micro-organism before incineration
2. After sterilizing discard disposable petri dishes and test tubes into a bin marked "Clinical WASTE"
3. After sterilizing, remove the culture media from reusable Petri dishes and test tubes and discard into a "CLINICAL WASTE" bin.
4. Wash and dry reusable Petri dishes and test tubes.
5. Collect "CLINICAL WASTE" bins daily, or more often if needed
6. Each day, wash bins with soap and water.
7. Wash hands after handling bins.

Management of Biomedical Waste in Laboratory

All the samples, chemicals in the laboratory medicine are considered as hazardous and these will be properly maintained and disinfected so that it couldn't have any adverse effect in the surrounding environment. Thus they will treat with the disinfectant solution in different sub-department in the following way;

a) Sample Collection Section

All the samples will be collected in a sample collection room. These will then send to the pathology department. Syringes after collection of samples will be destroyed by needle destroyer and collected in the dust bin. These will then sent to the hospital authority for disinfection with 1% of sodium Hypochlorite solution and buried in a cemented tank.

b) Hematology Section

Blood samples will be treated for disinfectant with 1% Sodium Hypochlorite solution. Then after these will be washed in a detergent, dried in hot air oven finally. They can be reused then after.

c) Biochemistry Section

Blood samples of the following department will be treated for disinfection with 1% sodium Hypochlorite solution. Then these containers will be washed with detergent and dried or sterilized in a hot air oven for certain period of time and then these containers will be reused then after.

d) Microbiology Section

In this unit after performing the test all those pretridishes, tubes, ABST plate will be autoclaved for 1.5 hr at 12⁰C or 15 IBS pressure. Then again these utensils will be washed with a detergent and dried or sterilized in a hot air oven.

e) Clinical Pathology Section

All the Urine and stool Samples will be discarded and flushed in a toilet. Then after these containers will be treated with the disinfectant (1% Sodium Hypochlorite solution). Then these containers will be finally washed with a detergent and dried or sterilized in a hot air oven. Then after, these containers will be ready for use.

f) Histopathology and Cytopathology Section

In cytopathology, Paps and FNACs will be performed. After the collection from lymphnides as rest of the body part, these needles will be destroyed with the needle destroyer and kept in a Sodium Hypochlorite solution for disinfection. In Histopathology different tissues will be collected in 10% Formalin (Preservative) and kept for a year. Then after, tissues will be washed with water, to free from formalin & then these tissues will be collected and buried in a hospital land field for decomposition.

7. Treatment of Health Care Waste

In general, wastes from each category will be treated according to the treatment methods and technologies described in table given below:

Table 8-3: Treatment and disposal methods for categories of health care waste

Categories of Health Care	Treatment Methods
Infectious waste: pathogens pathological and anatomical material, clothes, dressings, equipment/instruments and other items that may come into contact with infectious materials	<ul style="list-style-type: none"> Highly infectious waste such as cultures from lab work will be sterilized using wet thermal treatment, such as autoclaving.
Sharps: includes needles, scaples, blades, knives, infusion sets, saws, broken glass, nails etc.	<p>Following methods will be adopted to treat the sharps waste :</p> <ul style="list-style-type: none"> Sharps disinfected with chlorinated solutions Needles and syringes will undergo mechanical mutilation (e.g. milling or crushing) prior to wet thermal treatment (autoclaving)
Pharmaceutical waste: includes expired, unused, spoiled, and contaminated pharmaceutical products, drugs, vaccines, and sera that are no longer needed	<ul style="list-style-type: none"> Return expired drugs to supplier; or discharge to sewer only for mild liquid pharmaceuticals, not antibiotics or cytotoxic drugs, and into a large water flow. Ampoules will be crushed and disposed of with sharps. Expired drugs will be encapsulated in the hospital premises if supplier refuses to return.
Chemical waste:	<ul style="list-style-type: none"> Waste segregation strategy: brown bags/container, leak-proof plastic bag or container resistant to chemical corrosion

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	<p>effects.</p> <ul style="list-style-type: none"> Return unused chemicals to suppliers; small quantity will be discharged to sewage after treatment.
Waste with high content of heavy metals: batteries, broken thermometers, blood pressure gauges, (e.g. mercury and cadmium content).	<ul style="list-style-type: none"> Waste containing heavy metals will be separated from general health care waste. hazardous waste will be safely stored in designed site Selling to specialized facilities for metal recovery. Use of mercury free thermometer (digital thermometer) will be emphasized.
Pressurized containers: includes containers/cartridges/cylinders for nitrous oxide, ethylene oxide, oxygen, nitrogen, carbon dioxide, compressed air and other gases	<ul style="list-style-type: none"> Waste segregation strategy: pressurized containers will be separated from general health care waste. Recycling and reuse, crushing
General health care waste: (including food waste and paper, plastics, cardboard)	<ul style="list-style-type: none"> Black bag/container. Halogenated plastics such as PVC will be separated from general health care Disposal as part of domestic waste. Food waste will be segregated and composted. Component wastes (e.g. paper, cardboard, recyclable plastics 9PET, PE, PPO, glass) will be segregated and sold to recycling units.

8. Other Mitigation Measures

The following mitigation measures will be adopted for the proper healthcare waste management system.

Adopt the waste minimization principle:

By adopting the 6R principle (Reduce, Reuse, Recycle, Recovery, Redesign, be Responsible), generation of wastes at source will be reduced. Reuse will be promoted in case of general waste, bio-degradable general waste will be discarded as Metropolitan city waste and non-biodegradable general wastes will be sold for reuse.

Institutionalization of hospital waste management:

For the institutionalization of the waste in the hospital, the separate committee will be formed for dealing with all the problems and decision regarding the waste management as per the recommendation provided by World Health Organization (WHO) in document namely "Safe management of wastes from healthcare activities 2013".

Promote capacity building and knowledge sharing:

Training is essential so that the staff will understand and use the waste management system in the hospital. It is the medium for updating the staff on the international and national standards for waste management. So all the staff including doctors, nursing staff supporting staff, laboratory staff, and administrative staff will be trained on waste management so that they can comply with the system.

Develop the segregation at source system:

The waste will be segregated into the risk and non-risk waste. The non-risk will be further categorized into different categories as per the recycling value. The hospital will adopt the segregation system compatible with national guideline and WHO recommendations.

Adopt proper collection, transportation and storage system:

Waste will be collected and transported in every 24 hours in each units or department. Well-labeled trolleys will be used for collection and transportation. The onsite waste transportation system will be developed so that the waste can be transported safely. A close container will be used for the transportation of the risk waste including the sputum sample bottles, culture plates etc. An onsite storage facility will be established with tiled wall and floor, proper drainage so that there is no water logging or contamination. The development of onsite waste storage area will help the center to manage the waste in its own premises and reduce the risk of the waste.

Adopt Non-burn and environment friendly treatment and disposal system:

The risk waste will be treated using the steam-based technology. Other non-burn technology also can be used but in the case of the developing countries like Nepal, the autoclave technology is the most appropriate and affordable technology. For the management of the sharp waste i.e., the needles or syringes, the needle cutter and destroyers will be used to minimize the risk of needle stick injury and potential hazards. The general waste will be sent for recycling which may be the source of revenue generation for the hospital and this revenue can bear the operational cost to some extent.

Adopt the proper recording system:

Daily data recording system will be developed so that the record regarding the waste generation, waste for recycling will be maintained for waste tracking and monitoring.

Promote Occupational health and safety:

The occupational health and safety of the waste handlers will be at the high priority during the waste collection, transportation and storage. For the purpose they will be equipped with the full set of personal protective equipment (PPE) such as helmet, gloves, mask, apron, boot etc. Immunization facility will be given to the waste handler staff because needle incident have been frequently happened while handling the waste.

Develop Healthcare waste management policy:

Along with the waste management system in the hospital, the hospital will develop the Standard Operating Procedures (SOP) and manuals on the waste management. In addition, role and responsibilities of all staff will be clearly specified and managed.

Training and Awareness Program

Successful implementation of health care waste management plan will address training and awareness programme, which is a vital step to sensitize the personnel regarding the various aspect of healthcare waste management. Basic training in healthcare waste

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handling procedures will be provided to all the hospital personnel in service. The basic components of the training programme are as follows:

- The hazards associated with healthcare wastes and need of proper waste management system
- Methods of preventing transmission of infections related to waste handling methods.
- The various safety procedures for dealing with chemical, pharmaceutical and radioactive wastes and sharps
- Proper waste segregation handling, transport, treatment and disposal methods
- Use of proper personal protective gears like, gloves, during handling of health care waste.

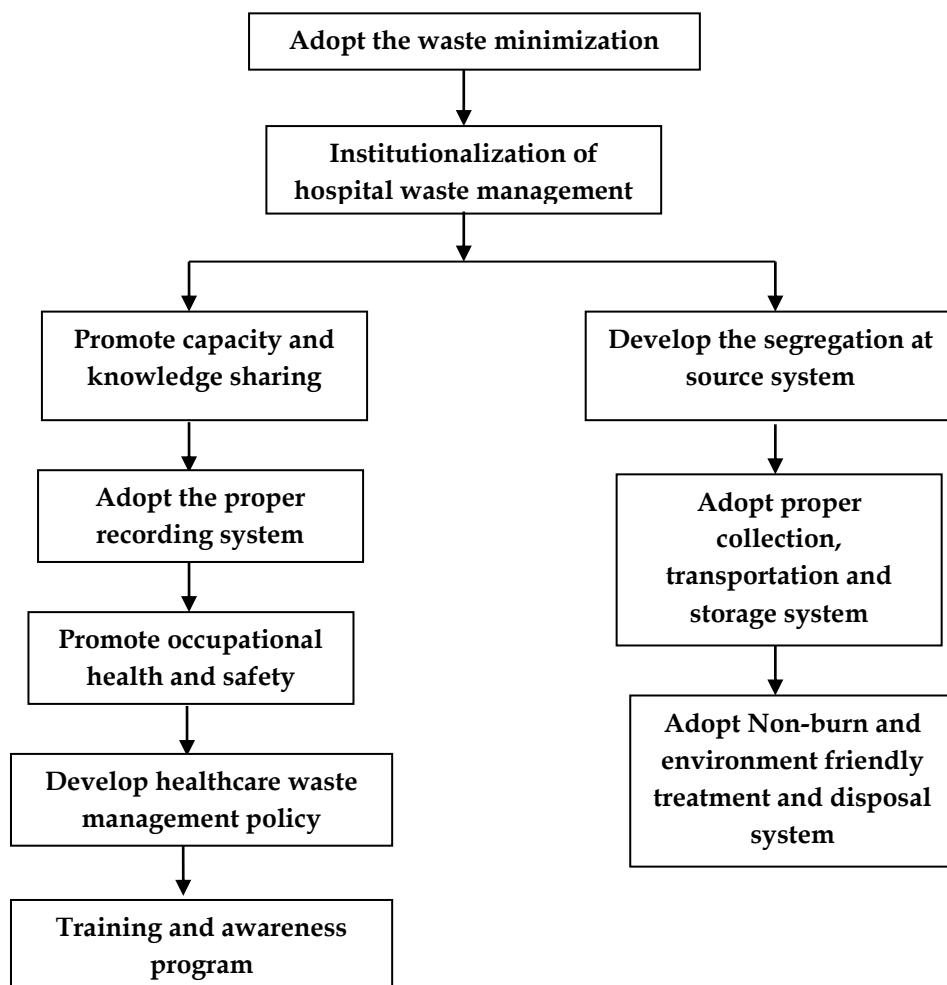


Figure 8-2: Waste management mitigation flow chart

8.2.2.1.2 Impact due to waste water generation

Generally two types of waste water will be generated from hospital which is as follows:

a) General wastewater from kitchen and sanitary

All general waste water from kitchen, laundry, bathrooms and rain water will be collected separately and treated by sewage treatment plant and will be reused for gardening and

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toilet flushing. Beside this excess treated waste water will be discharged to municipal drainage and drainage system will be maintained time to time.

b) Contaminated chemical wastewater

Contaminated wastewater may result from discharges from medical wards and operation theaters (e.g. body fluids and excreta, anatomical waste), laboratories (e.g. microbiological cultures, stocks of infectious agents), pharmaceutical and chemical stores; cleaning activities (e.g. waste storage rooms), and X-ray development facilities. Waste water may also result from treatment disposal technologies and techniques, including chemical disinfection. Separate pipe line will be used for collection of contaminated chemical waste water and will be processed as follows:

- a. Wastewater from X-ray development will be collected separately and used for removal of silvers.
- b. Pharmaceuticals will not be discharged to the sewer system but collected and return to the manufacturer.
- c. Procedures and mechanisms will be established to provide for separate collection of urine, feces, blood etc. as follows:

Blood, Serum and Plasma

1. All excess blood, serum and plasma specimens from different sections of the laboratory will be collected in a glass container or flask of sterilized by autoclaving for 30 minutes at 121⁰C (250⁰F).
2. Pipettes, test tubes and other glassware used in testing infections specimen (hepatitis, AIDS, typhoid fever etc.) will be soaked in 0.4 percent sodium hypochlorite solution (100 ml of 5 percent household bleach to a 1 liter of water) for at least 30 minutes before disposal or with detergent.

Urine and Feces

- a. After the testing is finished, fecal material in plastic and carton containers will be placed inside plastic.
- b. Slides cover slips, test tubes and bottles containing fecal material will be soaked in 5 percent phenol solution to 1 quart water or 5g phenol dilute to 100 ml then emptied into sewage system.
- c. Urine and other body fluids will be disposed directly into the soak pit. If infectious, disinfectant like 10 percent formalin or 0.5 percent hypochlorite solution will be added first before disposal.

Table 8-4: Treatment and disposal methods for liquid waste

Liquid waste	<ul style="list-style-type: none">• General wastewater and chemical contaminated waste water discharged lines will be separated.• General waste water will also discharge and collected by two different pipe lines.• All general waste water from kitchen, laundry, bathrooms and rain water will be collected separately and treated with suitable disinfectants based on chlorine solutions or calcium hypochlorite solution
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	<p>before discharged to soak pit.</p> <ul style="list-style-type: none">• Chemical contaminated wastewater will be neutralized and treated to separate heavy metals compounds and discharge to soak pit with high dilution.• Beside this waste water treatment plant will be constructed to treat waste water
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Wastewater treatment Plant

Currently the waste water generated from the hospital is 50,000 liters per day but after upgrading of hospital into 200 beds, the waste water generated per day will be 70,000 liters. Waste water treatment plant will be constructed for treatment of waste water treatment.

8.2.1.1.3 Impact due to air pollution

The following mitigation measures will be applied to minimize air pollution:

- Vegetation barrier will be used to prevent air pollution level
- Silent DG set will be used
- Periodic maintenance of generator will be done
- Hospital is declared as “No smoking zone” and smoking in premises will be strictly prohibited.
- Open burning of waste will be strictly prohibited.

8.2.1.1.4 Impact due to noise pollution

The main sources of noise during the operation of hospital are the movement of vehicles and operation of the standby generators. The noise pollution will be prevented by following measures

- Silent DG sets will be used
- Prohibit the use of horns in and around the hospital area
- Traffic signs indicating horns prohibition area and speed limits (up to 15 km/hr) will be placed

8.2.1.1.5 Impact due to contamination of ground water

The liquid waste generated from the hospital may pollute the land, contaminate the soil; and may contaminate the ground water, if the liquid waste will not handle properly. The contamination of ground water will be mitigated by adopting following method

- Drainage system will be maintained properly.
- Monitor timely to avoid leakage of drainage system

8.2.1.1.6 Impact due to Disaster (Earthquake, fire hazards, lightning, electrocution etc.)

The hospital building will be provided with firefighting system such as hydrant system, fire pumps, and main pump along with stand by pump. Emergency exit will be constructed to minimize the risk. The building has designed to resist the earthquake. A complete fire detection system with equipment complying with the requirements of fire services agency will be provided. Earth link circuit breaker (ELCB) will be provided for all electrical

connections. Beside this, necessary training and awareness program about emergency and preparedness plan will be conducted. Disaster risk reduction training will be provided to the staffs of hospital. Central supply system for Oxygen gas will be provisioned to avoid cylinder related risks.

8.2.1.1.7 Radiation hazard from Radiological Equipment

The radioactive rays are released by the X-ray machines, ECG machines and MRI machines. These rays are very hazardous to human health. The x-rays may cause cancer in the human body if it is penetrated frequently. These cannot be mitigated but can be prevent from by applying following method

- Radiologist will be trained properly.
- Awareness raising among workers about safe handling of machines
- Use of safety gears to prevent accident.
- Radioactive waste will be stored safely as per guidelines of IAEA.
- X-Ray operator will be provided with protective coats.
- Patients will be allowed to enter X-Ray room using protective coats only.
- The X-ray door will be lead coated and always let closed when in operation.
- Pregnant women will not be allowed to pass the way and to enter the room. Nobody will be allowed to enter the room without permission.
- The sign and notification of danger will be dispatched

8.2.1.1.8 Impact due to chemical and heavy metal waste

Various types of chemicals as well as hazardous substance will have to be discharged during the healthcare treatment activities. If the chemical and hazardous substances will not properly handled, managed and disposed, it will adversely affect the environment through the entry of chemicals in air, soil and water. The following measures will be adopted to minimize the risk of chemical contamination to soil and water:

- Awareness amongst the workers for the safe handling of chemicals will be raised
- Supervision will be done in order to avoid the spills of any chemicals
- Chemical contaminated wastewater will be discarded after making it disinfectant

8.2.1.1.9 Impact due to Mercury

The hospital has already phase out mercury-associated equipment gradually. Instead of using mercury associated thermometer and Sphygmomanometers, digital thermometers and mercury free sphygmomanometers, mercury free dentistry have been considered for the hospital. Children and pregnant women will be strictly prohibited to enter in the dentistry room.

8.2.1.2 Biological Environment

8.2.1.2.1 Impact on Urban Biodiversity

Open space will be allocated to develop greenery within hospital premise. The greenery and beautified garden areas will please the hospital environment and enhance a better feeling among the patients and the visitors. Emphasis will be given for the maintenance of the greenery and garden area. The hospital will plant trees in the hospital premises to maintain environment friendly environment.

8.2.1.3 Socio-economic and Cultural Environment

8.2.1.3.1 Impact due to occupational health and safety

The health and safety of hospital staffs and patients in the hospital will be a prime concern and top priority of the hospital management. The necessary awareness and skill enhancement trainings are not impart, handling of equipment and chemicals may result in occurrence of wound, transfer of diseases and possible accidents. Although the primary victims will be the staffs, hospital workers, patients, care takers, sometimes local people may also be affected. The hospital will carry out the following mitigation measures to prevent occupational diseases and accidents.

- Formation of “Waste Management as well as Occupational Health Safety Committees”
- Awareness and training to all staffs on health and safety issues
- Provision necessary safety gears and follow diseases preventive measures
- Emergency preparedness plan will be prepared, implemented and documented
- Regular engineering maintenance on sterilization equipment must be performed and documented.
- The storage area used for biohazardous and medical waste accumulation will be secured to prevent access by unauthorized persons. Warning signs must be posted on entry doors. These warning signs must be in both English and Nepali and must state “CAUTION BIOHAZARDOUS WASTE STORAGE-UNAUTHORIZED PERSONS KEEP OUT”,
- Only chlorine bleach will be allowed to be disposed of down the drain for discharge into the public sewer system i.e. municipal system. All other chemical disinfectants or waste with any additional hazardous properties (chemical or radiological) will be picked up for disposal as hazardous waste.

Table 8-5: Standard precautions to be used in the care of patients

Particulars	Measures to be followed
A. Hand washing	<ul style="list-style-type: none"> • Wash hands after touching blood, secretions, excretions and contaminated items, whether or not gloves are worn. • Wash hands immediately after gloves are removed, between patient contacts. • Use a plain soap for routine hand washing. • Use an antimicrobial agent for specific circumstances.
B. Gloves	<ul style="list-style-type: none"> • Wear gloves when touching blood, body fluids, secretions, excretions, and contaminated items. Put on clean gloves just before touching mucous membranes and non-intact skin.

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C. Mask, eye protection, face shield	<ul style="list-style-type: none"> • Wear a mask and eye protection or a face shield during procedures and patient care activities that are likely to generate splashes or sprays of blood, body fluids, secretions, and excretions.
D. Gown	<ul style="list-style-type: none"> • Wear a gown during procedures and patient-care activities that are likely to generate splashes or sprays of blood, body fluids, secretions, or excretions.
E. Patient care equipment	<ul style="list-style-type: none"> • Ensure that reusable equipment is not used for the care of another patient until it has been cleaned and reprocessed appropriately.
F. Environmental control	<ul style="list-style-type: none"> • Ensure that the hospital has adequate procedures for the routine care, cleaning, and disinfection of environmental surfaces.
G. Linen	<ul style="list-style-type: none"> • Handle used linen, soiled with blood, body fluids, secretions, and excretions in a manner that prevents skin and mucous membrane exposures, and that avoids transfer of microorganisms to other patients and environments.
H. Occupational health and blood borne pathogens	<ul style="list-style-type: none"> • Take care to prevent injuries when using needles, scalpels, and other sharp instruments or devices. • Use ventilation devices as an alternative to mouth-to-mouth resuscitation methods.
I. Place of care of the patient	<ul style="list-style-type: none"> • Place a patient who contaminates the environment or who does not assist in maintaining appropriate hygiene in an isolated (or separate) room

8.2.1.3.2 Pressure on community resources and infrastructure

The hospital will lobby for strengthening of social activities to minimize the pressure on social services. The hospital will construct waste water treatment plant to treat waste water. Possible pressure on social services from the operation of the hospital will be mitigated by following measures

- Waste water treatment plant will be constructed
- Discount facility will be given to poor, marginalized and old age people

8.2.1.3.3 Grievances and Law order situation

There will be strict management plan for the workforce to avoid the unnecessary disputes and conflicts among them. Proper instruction will be given to the employee to maintain the friendly and harmonious relation between them and the local people. If anyone found guilty they will be punished or expelled from the job. If the case will not resolved police department will be informed. Any relevant grievances received from the local community will be addressed eventually based on the nature and complexity of the grievances. Grievances redress committee will be formed to address grievance.

8.2.1.3.4 Impact due to traffic congestion

Traffic density increases significantly with the rate of increase in vehicle and the flow of number of people around hospital premise. Daily activities of people near project site will result in increase in traffic density. Hence, there will increase the risk of traffic accidents in the area. Sufficient parking space will be allocated to manage the high traffic density in and around the project site. Installation of hoarding board and awareness programs will be conducted in the project area to aware the public. Safety instruction signboard or hording boards will be installed in the risk zone. Speed barrier or breaker for vehicles in road will

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be constructed. Beside this, local people will be instructed not to allow their children to play in the road.

8.2.1.3.5 Hospital Service Management

The CC cameras will be used in hospital for supervision of staffs. The provision of reward will be made for best workers. Supervisor will be responsible for supervision of the all department and their works. Daily records will be made and any problems and issues rose. Any conflicts will be solved through internal understanding. UMHT will prepare work plan on how to run the hospital properly and will function based on the plan in order to provide good and efficient service to the people. As per the demands it will upgrade its facilities, will recruit qualified and experienced staff and will work hard to maintain the quality of the services to be provided to the local people. The Public Announce System (PAS) will be adopted in hospital for immediate announce for emergency and other services. Although, Sub code system and separate telephones are installed, it will be further developed in each place of necessities. The size of OPD room will be 14 Sq.m. and bed gap will be 4 feet.

8.2.1.3.6 Impact due to food and sanitation

The following mitigation measures will be adopted for health and hygiene.

Table 8-6: Standard to be used in the Health and hygiene

Particulars	Measures to be followed
A. Hand washing	Use gloves for specific waste handling, Wash hands after touching contaminated items, whether or not gloves are worn. Wash hands immediately after gloves are removed Use a plain soap for routine hand washing. Use an antimicrobial agent for specific circumstances. Hand washing techniques will be taught to staffs and visitors, patients
B. Gloves	Wear gloves when washing utensils. Put on clean gloves just before touching waste water, other solid wastes, toilet areas and other public area
C. Mask, eye protection, face shield	Wear a mask and eye protection or a face shield during procedures and cooking activities, trimming vegetables etc.
D. Uniform and Caps	Wear gown and cap during cooking activities
F. Environmental control	Ensure that the hospital has adequate procedures for the routine care, cleaning, and disinfection of environmental surfaces.
H. Occupational health and hazards	Take care to prevent injuries when using sharp instruments or devices

8.2.1.3.7 Health and sanitation in and around the hospital

The hospital waste is a great threat to the health and sanitation in and around its area. The health care waste will be managed as guided by Health Care Waste Management Guidelines, 2014. Biodegradable waste will be managed by co-ordination with the private operators of the area and the infectious waste will be managed by using autoclave. Beside this, Free Health camping will be conducted and cleanliness programs will be organized around the hospital.

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Table 8-7: Summary of Physical and Chemical Environment impact mitigation measures, responsible agency and cost

Issues	Impact	Mitigation Measures	Responsible Agency	Mitigation cost (NRs.)
Operation Phase				
Impact due to healthcare waste generation	Different infectious waste, pathological waste, radiological waste, sharps glasses, syringes, pharmaceutical waste will be generated by hospital and laboratories.	Hospital will follow 6R principle (i.e. Reduce, Reuse, Recycle, Recovery, Redesign and be Responsible). Infectious waste will be disposed after autoclaving Syringe will be destroyed using needle destroyer. Biodegradable waste will be sent to municipal waste Mercury free equipment will be used in hospital. Health care waste management committee will be established in hospital Health care waste will be managed by Health Care Waste Management Guidelines, 2014	<ul style="list-style-type: none"> • Proponent • Environment management unit • Hospital wards 	4,00,000
Impact due to waste water generation	Wastewater generated from laboratories, Operation Theater, X-ray department, hospital ward, toilet and disinfection and cleaning during the operation of the hospital will be hazardous if not treated properly.	Waste water generated from hospital will be treated by waste water treatment plant Waste water from lab, Operation Theater will be treated with disinfectants based on chlorine solutions	<ul style="list-style-type: none"> • Proponent • Environment management unit 	Included in project cost
Impact due to air pollution	Operation of generator and vehicular emissions will contribute air pollution which cause health problem.	Use vegetation barrier to prevent air pollution level Silent DG set will be used Periodic maintenance of generator Hospital will be declared as “No smoking	Proponent Environmental Management Unit	2,00,000

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		zone” and smoking in hospital premises will be strictly prohibited.		
Impact due to noise pollution	Main source of the noise pollution during the operation of hospital will be from movement of vehicles and operation of the generators which cause health problem.	Purchase of the silent DG sets Prohibit the use of horns in and around the hospital area Traffic signs indicating Horns prohibition area and speed limits (up to 15 km/hr) will be placed	Proponent Environmental Management Unit	Included in project cost
Impact due to contamination of ground water	Hospital generates large amount of liquid waste which will contaminate the ground water resource if not treated properly.	Drainage system will be maintained properly. Monitor timely to avoid leakage of drainage system	Proponent Environmental Management Unit	1,00,000
Impact due to Disaster (Earthquake, Fire hazards, lighting etc.)	Loss of lives and properties due to different probable disasters in future like fire hazard, earthquake etc.	Provision of emergency exit system Fire extinguisher will be installed at different places PAS will be provisioned Staff will be trained for emergency preparedness Staff will be trained for proper operation and regular maintenance of equipment. Earth link circuit breaker (ELCB) will be provided for all electrical connections	Proponent Environmental Management Unit	5,00,000
Radiation Hazard from radiological equipment’s	Radiation hazard from radiological equipment’s can cause health problems	Radiologist will be trained properly. Awareness raising among workers about safe handling of machines Use of safety gears to prevent accident. Radioactive waste will be stored safely as per guidelines of IAEA. X-Ray operator will be provided with protective coats. Patients will be allowed to enter X-Ray room using protective coats only. The X-ray door will be lead coated and	Proponent Environmental Management Unit	2,00,000

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		<p>always let closed when in operation. Pregnant women will not be allowed to pass the way and to enter the room. Nobody will be allowed to enter the room without permission. The sign and notification of danger will be dispatched</p>		
Impact due to chemical and heavy metal waste	<p>Different types of chemical wastes and heavy metal waste will be generated by hospital. If these infectious chemical wastes and heavy metal waste will be not properly managed can cause the serious problems in the local area.</p>	<p>Awareness amongst the workers for the safe handling of chemicals will be raised Supervision will be done in order to avoid the spills of any chemicals Chemical contaminated wastewater will be discarded after making it disinfectant.</p>	Proponent Environmental Management Unit	1,00,000
Impact due to Mercury	<p>In the dentist ward of hospital there might be use of the mercury for the teeth filling, which will be hazardous to health of patient</p>	<p>Hospital has phased out mercury-associated equipment. Instead of using mercury associated thermometer and Sphygmomanometers, digital thermometers and mercury free sphygmomanometers, mercury free dentistry will be used in hospital.</p>	Proponent Environmental Management Unit	2,00,000
Total mitigation cost for physical and chemical environment (Operation phase)				17, 00,000

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The summary of biological impacts during operation phase along with their mitigation measures are presented in table 8-8.

Table 8-8: Summary of biological environmental impact mitigation measures, responsible agency and cost

Issues	Impact	Mitigation Measures	Responsible agency	Mitigation cost (NRs.)
Operation Phase				
Impact on urban biodiversity	The haphazardly disposal of solid waste generated from hospital may affect avi-fauna (crow, sparrow etc.) of local surrounding.	Solid waste will not be disposed haphazardly Open space will be allocated for gardening and plantation. Awareness program will be conducted for tree plantation and maintain greenery with in hospital premise	Proponent Environment Management Unit	2,00,000
Total Cost (Operation Phase)				2,00,000

The summary of socio-economic and cultural impacts along with their mitigation measures is presented in table 8-9.

Table 8-9: Summary of Socio-economic and cultural environmental impact mitigation measures, responsible agency and cost

Issues	Impact	Mitigation Measures	Responsible agency	Mitigation cost (NRs.)
Operation Phase				
Impact due to occupational health and safety	All individuals exposed to hazardous health-care waste will potentially at risk, including those within health-care establishments that generate hazardous waste, and those outside these sources who either handle such waste or are exposed to it as a consequence of careless management.	Formation of “Waste Management as well as Occupational Health Safety Committees” Awareness and training to all staffs on Health and safety Issues Provision necessary safety gears and follow diseases preventive measures Emergency preparedness plan will be prepared, implemented and documented. The storage area used for biohazardous and medical waste accumulation will be secured to prevent access by unauthorized persons.	Proponent Environmental Management Unit	4,00,000

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Pressure on community resources and infrastructure	Due to increase in patient flow in hospital will have extra pressure to the existing public utilities such as electricity, water supply, waste disposal and municipal drainage system facilities, transportation available at the location of the hospital	Waste water treatment plant will be constructed Discount facility will be given to poor, marginalized and old age people	Proponent	No additional cost
Grievances and law order situation	Complaints related to impacts, demands, services, financial support for the community development are the main concern of grievance management	Proper instruction will be given to the employee to maintain the friendly and harmonious relation between them and the local people. Any relevant grievances received from the local community will be addressed eventually based on the nature and complexity of the grievances. Grievances redress committee will be formed to address grievance	Proponent	No additional cost
Impact due to traffic congestion	Traffic density increases significantly with the rate of increase in the commercial markets and the flow of number of people in hospital area.	Roadside parking at the entry of the hospital must be not allowed or relocated by enforcement of law Awareness camping program will be conducted Speed barrier or breaker for vehicles in road will be constructed Traffic signboard such as “no horn signs” and speed limit up to 15 km/hr etc. will be placed Systematic parking area will be developed	Proponent	1,00,000
Hospital Services management	Minute mistakes of health staff can lead to huge conflict. Problems related to the service management such as quality health care facilities, hospital waste, staff management will arise if proper management plan will not prepared.	Supervisor will be responsible for supervision of the all department and their works Daily records will be made Any conflicts will be solved through internal understanding The Public Announce System (PAS) will be adopted in hospital for immediate announce for emergency and other services.	Proponent	No additional cost

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Impact due to food and sanitation	Unhygienic food and sanitation might cause different health problems.	Use gloves for specific waste handling Wear gown during\cooking activities that are likely to generate sweets. Take care to prevent injuries when using sharp instruments or devices used.	Canteen unit Environmental Management Unit	1,00,000
Health and sanitation in and around the hospital	If hospital wastes will not be properly segregated and disposed, it may create a risk to hospital visitors as well as nearby settlement	Conduct Awareness program Free Health camping will be conducted Cleanliness programs will be organized	Proponent Environmental Management Unit	1,00,000
Total cost for Socio-economic mitigation cost (Operation phase)				7,00,000

8.3 Summary of Environmental Cost

Table 8-10 present the summary of the environmental cost. The total cost allocated for environmental cost is NRs. 52, 00,000.

Table 8-10: Environmental Cost

SN	Particulars	Cost (NRs.)
1.	Environmental Enhancement Measures and CSR cost (A)	16,00,000
2.	Environmental Mitigation Measures	
2.1	Mitigation Costs for Physical environment and Chemical Environment (Operation Phase)	17,00,000
2.2	Mitigation Cost for Biological Environment (Operation)	2,00,000
2.3	Mitigation Cost for Socio-economic and cultural environment (Operation)	7,00,000
	Total Environment Mitigation Cost (B)	42,00,000
3	Monitoring Cost (C)	4,00,000
4	Environmental Auditing Cost (D)	6,00,000
	Total Environmental Cost (A+ B+C+D)	52,00,000

8.4 Health and Safety Plan

The health and safety management committee will be formulated to safeguard the employees through provisions of safety education and training of management, supervision and operatives. The provision of a safe and healthy working environment all times for all employees and visitors during operation of United Mission Hospital Tansen is required.

A safe system of work will be designed by a health and safety management committee to protect personnel and company asset from unforeseen injury, loss and damages. The committee will provide the site safety rule, safety training information and communication, supervision, health and safety training. Similarly, the proponent will compel the workforce to use the personal protective equipment to keep safe occupational health. Prior the construction and operation phases the roles and responsibilities of the health and safety management committee will be prepared.

8.5 Disaster Risk Management Plan

The disaster management plan include following steps:

i) Preparation of disaster risk management manual/safety manual

The hospital will prepare disaster risk management manual or safety manual outlining the accountabilities and responsibilities of department heads, staff and employee.

ii) Formation of disaster management committee

Formation of a disaster management committee is the first step for making a disaster management plan in hospital. The different departments and officer that comes under the committee are as follows:

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- Director-Chairman
- Head of all hospital department/units
- Public Relation Officer – Member
- Officer Medical Store – Member
- Officer General Store – Member
- Nursing Superintendent – Member
- Blood Bank Officer – Member
- Executive Engineer (Civil) – Member
- Executive Engineer (Elec.) – Member
- Chief Medical Officer Casualty & Transport – Member Secretary

iii) Control room

The office of the Director will act as the control and will have good communication network like landline, mobiles and if possible in hospital CUG (Close user group mobile connection). The Chief Medical Officer will ensure that the control room will have all contact numbers of the hospitals, staff which is mentioned in the incident command. The control room will also have contacts numbers of district medical authorities, District Administration Office, Police, Fire Services, nearby hospitals, Private physicians, Blood Banks, NGOs etc. which will be contacted if external help will be needed.

iv) Allocation of Patients Treatment Site

The disaster management committee will authorized one of their senior doctor as an operation chief to manage the allocated different site. The treatment place will be decided by the disaster management committee. The location of each area will be planned for the efficiency of the service at the time of emergency.

v) Medical Support Services

The committee will decide who will handle the medical support service. The incharge of medical support services will ensure that the necessary investigations will not be delayed. Further, the incharge will be back up by the other different unit of the hospital.

vi) Logistic arrangements:

The committee will appoint logistic chief who will take charge of supporting services of hospital during the time of disaster:

- Communication
- Transport
- Dietary Supply
- Sanitation
- Water & Electricity

vii) Security:

The hospital will have their own security. The security unit will be briefed about the emergency plan and their role during the time of disaster.

viii) Risk management:

First part of disaster risk management plan is to develop the risk profile. The possible disaster in the hospital is shown in Table 8-11.

Table 8-11: List of possible disaster in the hospital

Hazard	Likely impacts	Time
Earthquake	Human lives lost Hospital infrastructure damaged	Anytime
Fire	Damage to the hospital infrastructure Destroy the equipments and machineries	Anytime
Strong wind	Damage to the hospital infrastructure	April May June
Urban flood/flash flood	Submerge of hospital infrastructures Damage to hospital building	During Monsoon Season

The disaster management committee will work to reduce the risk of mass casualty situation. There are different natural disasters that can damage the hospital building. The hospital will adopt resilient measures to deal with different types of disaster to reduce impact of damage in their properties and lives of people. Two main possible disaster risks to the hospital are earthquake and fire. The disaster management committee prime responsible is to protect the hospital from the consequences if these disaster and prepare plan for other disasters. For this, the hospital will undertake the multispectral action that includes:

- Earthquake resistant hospital building will be constructed.
- Installation of early warning system, safe evacuation training, shelter plans and protection from extreme events i.e. earthquakes, floods, hailstorm, fire hazards etc.

ix) Mitigation:

The mitigation plan is the most effective strategy to reduce the risks of disaster. Mitigation plans are related with structural and non structural. Structural mitigation measures are planning for buildings which include follow of building codes, installation of fire extinguishers, fire heel rose, fire hydrant, fire smoke detector etc. Similarly, Non structural measures include training for the staffs, insurance for risk transfer and allocation of safe space within hospital.

x) Preparedness:

Under the preparedness, the following things need to be figured out.

- Allocation of open space/safe place to gather during time of disaster
- Ensure proper maintenance and function of all firefighting equipment
- Adequacy of First aid kits
- Prepare the structure for the safety of storehouse that includes medical supplies
- Ensure warning system are in placed that is sirens, horns and light signals for proper indications
- Prepare for arrangement of safe drinking water supply
- Training to all the staff to act in the time of earth quake i.e. Do's and Don'ts for Natural disaster

xi) Response at the time of disaster:

Based on the team formed by the disaster management committee, the designation of the team will play their role as mentioned in the pre disaster phase. This will avoid the duplication of efforts by clear demarcating the area specific task force teams. The emergency support function needs to be response during and after disaster.

xii) Recovery:

Under the recovery stage, the damages of the disaster will be recovered. This depends upon the type of damage and people affected. The task force will start the repairing, restoration, and strengthening of affected structures.

8.6 Emergency Response Management Plan (ERMP)

The event of serious accidents such as accident due to heavy equipment/machinery, traffic accident, electric hazard, accidental hazard, and other probable risk may occur during construction and operation phase of the project. Workers/Employees/Personnel will be trained for operational procedures and proper maintenance of firefighting/extinguishing equipment and detection system to face or handle the hazards at the time of emergency. In addition, any kind of emergency responses requirements that arise during the project of construction and operation phases are planned. The EMU is responsible for implementation of ERMP during construction and operation phase.

8.7 Traffic Management Plan (TMP)

The traffic management plan is one part of the overall environmental management plan of UMHT. Similarly, due response to UMHT Traffic Management Plan (TMP) has been developed; the objective of the Plan is to address transportation system management issues in a comprehensive manner and to put all requirements for the safe transport operation in UMHT. The EMU will oversight the TMP. Prior the implementation of TMP, the stakeholder consultation will be held to obtain their views, ideas and such justifiable ideas will be incorporated in TMP. The stakeholders include local community, district line agencies, police and traffic police. The office will seek the regular advice and support from nearest traffic office. Based on the site conditions and nature of the job to be performed at UMHT, one human resource will be recruited while implementing Traffic management plan.

8.8 Grievance redresses mechanism and reporting mechanism

Along with construction and operation of hospital the people may have complain on different activities of the project. Procedure of lodging complain will be established to allow local people, patient and other relevant institution to appeal any disagreeable practice and activities arising from the project activities. There is the potentiality for grievance related to hospital quality services, hospitality, CSR activities, community infrastructure and other community related issues. The hospital will formulate the grievance redress committee to resolve complains. The patient and other stakeholder can lodge his/him complain to hospital office or complaint box. The Executive director through its staff verifies the issues and gives their decision within 7 days of the compliant register in the office. If the issue is settled, the process ends. If the issue is not solved to

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the satisfaction, the concern will be forwarded to hospital owner. They verify the issues and call meeting to solve the problem. The hospital owner will provide its decision to the concerned issues within 15 days of complain received. If the issue is settled, the process ends. If not settled then process continues according to law.

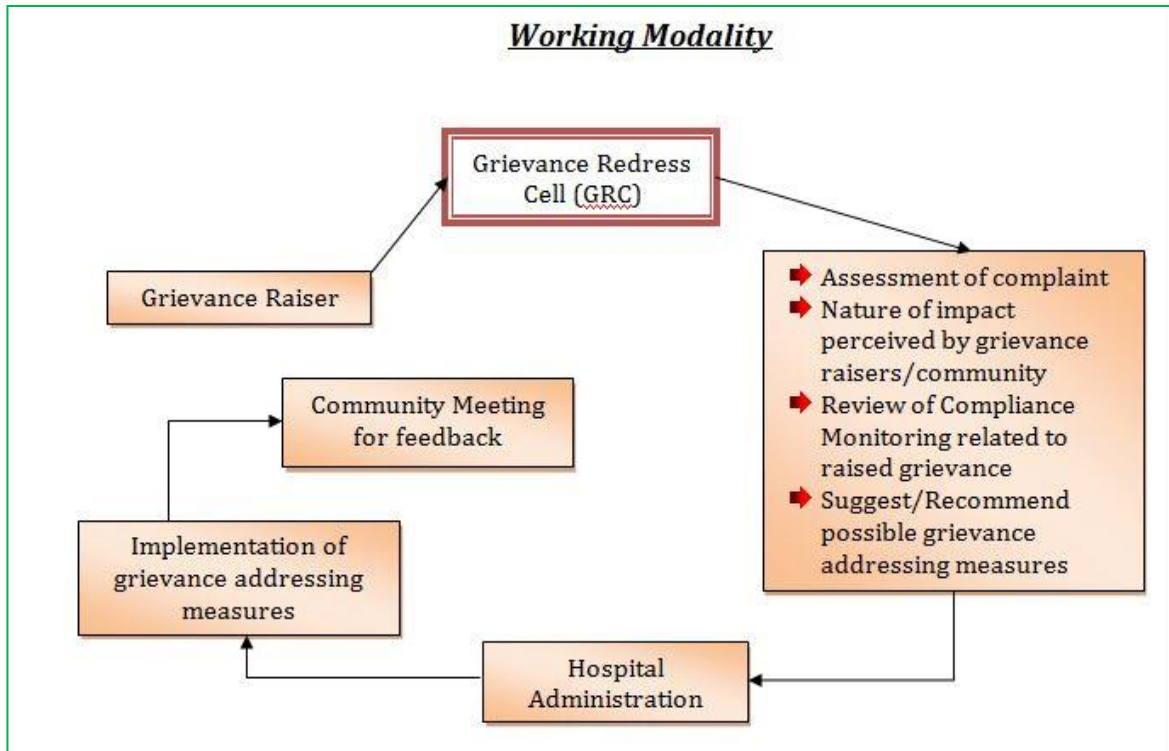


Figure 8-3: Grievance Redress Plan

8.9 Environmental Management Unit and Housekeeping unit

Environmental Management Unit will be established to keep hospital environment friendly. The major duties and responsibilities of Environmental Management Unit will be implementation of environmental management plan, regulatory compliance with all relevant rules and regulations, regular operation and maintenance of pollution control devices, minimization of environmental impacts, implementation of environmental monitoring as per approved schedule, documentation of good environmental practices and applicable environmental laws, coordination with regulatory agencies and external consultants, keeping of log book for public complaints and the action taken, formulation of the waste management plan etc. Beside this, housekeeping unit will be also established in hospital to manage the hospital activities and for keeping proper hospital record.

To ensure the implementation of EPMS, UMHT is committed to establish Environment Management Unit (EMU). EMU is the inbuilt mechanism within the UMHT that governs the implementation and monitoring of the EPMS. The EMU will focus on compliance monitoring, record keeping, and providing technical inputs to the contractors.

Apart from having an Environmental Management Plan, it is also necessary to have a permanent organizational set up charged with the task of ensuring its effective implementation of mitigation measures and to conduct environmental monitoring.

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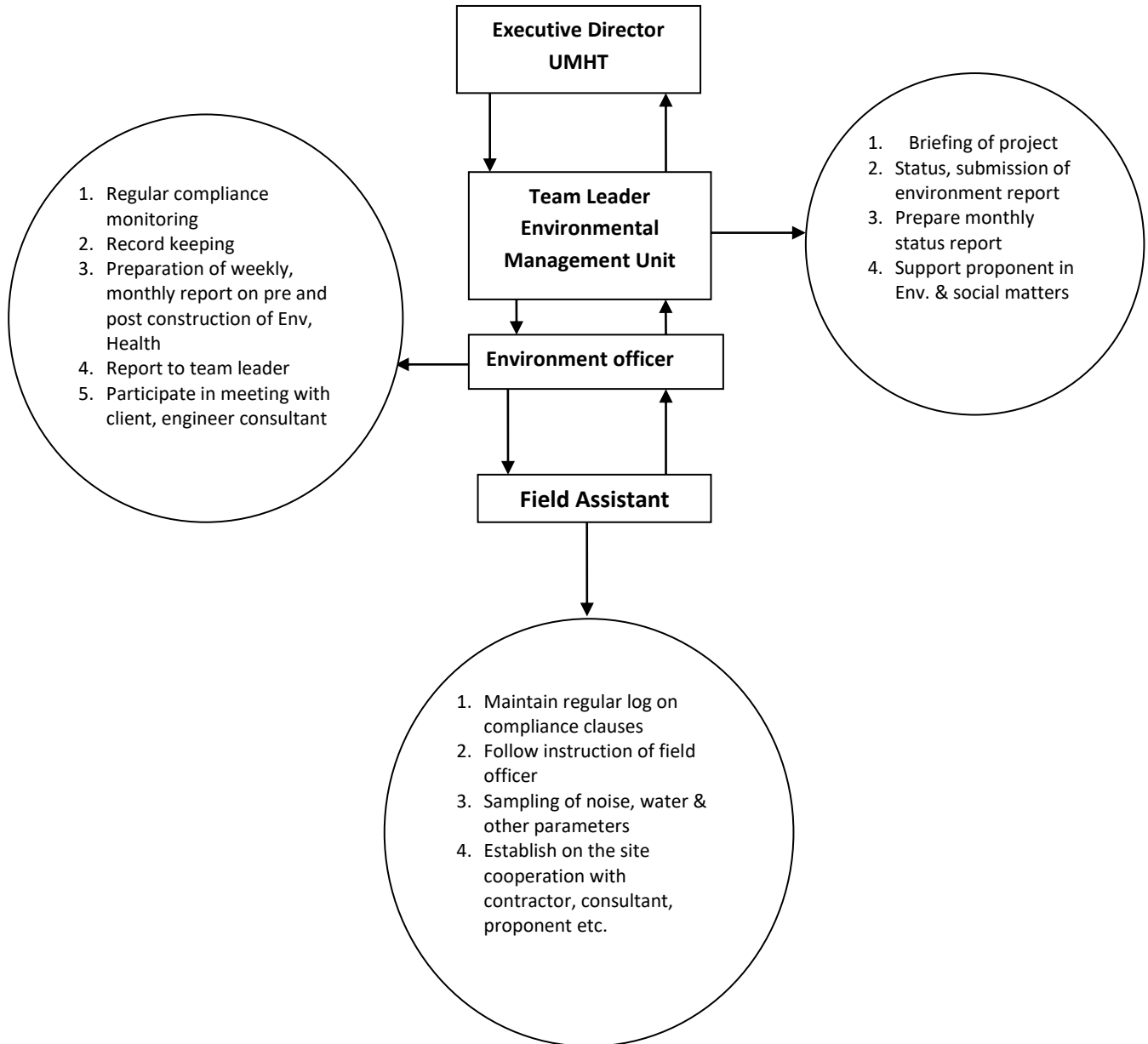


Figure 8-4: Staff and Flow Diagram of Reporting Mechanism

8.10 Environment Management Plan

The proponent has prepared Environmental Management plan to enhance beneficial impacts and to mitigate the adverse impacts during the operation phase of the hospital.

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Table 8-12: Environment Management Plan during Operation Phase

Thematic Areas	Adverse impact mitigation activities	What to do	Where to do	How to do	When to do	Who will do	Estimated human resources, budget, time	Monitoring and Evaluation
Physical Environment	Health care waste management plan							
	Reduce healthcare waste at the source	-To replace the product / change the product / change the behavior. -Prioritize the use of reusable and recyclable items	Hospital ward, pharmacy, laboratory, office, OT room	By reducing healthcare waste at the source	Operation phase	Proponent	Included in chapter 8	MoFE, MoHP, DoEnv, Tansen Municipality
	Categorization of waste	Waste will be segregated at point by labeling colour coded waste bin	Hospital ward, pharmacy, laboratory, office, OT room	By using color coded waste bin	Operation phase	Proponent	Included in chapter 8	MoFE, MoHP, DoEnv, Tansen Municipality
	Waste collection	Waste will be collected at central waste collection center.	Central waste collection center	By collection of waste from different departments	Operation phase	Proponent	Included in chapter 8	MoFE, MoHP, DoEnv, Tansen Municipality
Healthcare Waste management	-Infectious waste will be sterilized by autoclaving -Human organs and placenta will be kept in placenta pit. -Needle will be destroyed by needle cutter -Strategy will be adopted	Central waste collection center	By using different methods for management of waste	Operation phase	Proponent	Included in chapter 8	MoFE, MoHP, DoEnv, Tansen Municipality	

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		to return the date expired medicine to the manufacturing company -Radioactive waste will be storage safely. -Lead coat apron will be used to avoid radiation pollution. -Recycle waste will be sold to vendor						
	Waste disposal	Biodegradable waste will be managed by coordination with municipality	Municipality	Coordination with municipality	Operation phase	Proponent	Included in chapter 8	MoFE, MoHP, DoEnv, Tansen Municipality
Waste water management plan								
	Hospital will install waste water treatment plant for treatment of waste water Waste water will be send to drainage after treatment only	-Effluent will be collected. -Screening will be done after that effluent will be sent to the collection chamber. -Then sent to aeration tank and sludge settling tank. -Then treated waste water will be collected to filter tank. -Finally treated waste water will be used in gardening or send to drainage	Waste water treatment area	By installation of waste water treatment plant	Operation phase	Proponent	Included in chapter 8	MoFE, MoHP, DoEnv, Tansen Municipality
Disaster management plan								

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	To provide training on emergency preparedness	To implement emergency accident reduction measures	Hospital area	By providing training	Operation phase	Proponent	Included in chapter 8	MoFE, MoHP, DoEnv, Tansen Municipality
	Construction of Emergency exit	Use of Emergency exit	Hospital building	By construction of emergency exit	Operation phase	Proponent	Included in chapter 8	MoFE, MoHP, DoEnv, Tansen Municipality
	Installation of fire control device	Fire extinguishers will be used	Every block/floor of hospital building	By installation of fire control device	Operation phase	Proponent	Included in chapter 8	MoFE, MoHP, DoEnv, Tansen Municipality
	Installation of fire extinguisher / smoke detector technology	Installation of fire extinguisher / smoke detector	Every block/floor of hospital building	By installation of fire extinguisher / smoke detector technology	Operation phase	Proponent	Included in chapter 8	MoFE, MoHP, DoEnv, Tansen Municipality
	Storage of water for fire control in case of emergency	Storage of water for fire control in case of emergency	Hospital area	By storage of water in storage tank	Operation phase	Proponent	Included in chapter 8	MoFE, MoHP, DoEnv, Tansen Municipality
	To rescue the injured in case of emergency	Formation of emergency rescue committee which include medical officer / surgeon / chief nurse / financial management officer / material storage and supply / security guard	Hospital area	Keeping Records	During hazard	Proponent	1 Medical Officer 1 Surgeon 1 Chief Nurse 1 Security Guard	MoFE, MoHP, DoEnv, Tansen Municipality
Traffic management plan								
	Sufficient	To park the vehicles in	Parking area	By allocation	Operation	Proponent	1 security	MoFE, MoHP,

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	parking area will be allocated	the parking area and to manage the manpower for the related management		of parking area	phase		guard	DoEnv, Tansen Municipality
	Separate entry and exit gate will be constructed for vehicular movement	Two main gates will be used	Parking area	By keeping separate entry and exit gate	Operation phase	Proponent		
	To make separate lines for different types of vehicles such as ambulances, vehicles, motorcycles, etc.	Separate line parking for vehicles such as ambulances, vehicles, motorcycles etc.	Parking area	By keeping separate lines for different types of vehicles	Operation phase	Proponent	Included in chapter 8	MoFE, MoHP, DoEnv, Tansen Municipality
Socio-economic and cultural environment	Health, Sanitation and Security Plan							
	A clean environment will be maintained by daily cleaning in the hospital area	To provide training related to sanitation and safety	Hospital area	By providing training	Operation phase	Proponent	Included in chapter 8	MoFE, MoHP, DoEnv, Tansen Municipality
		Daily cleaning will be done	Hospital area, ward, toilet, laboratory etc.	By cleaning of hospital ward, toilet etc. daily	Operation phase	Proponent	Included in chapter 8	MoFE, MoHP, DoEnv, Tansen Municipality
		Security guard will be arranged	Hospital area	By keeping security guard	Operation phase	Proponent	Included in chapter 8	MoFE, MoHP, DoEnv, Tansen Municipality
		Proper management of	Waste	Proper	Operation	Proponent	Included in	MoFE, MoHP,

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	waste	management area	management of waste	phase		chapter 8	DoEnv, Tansen Municipality
Grievance Redress Management							
To reduce the conflict created by addressing the received complaints	<p>Grievance Redress Cell will be established</p> <p>Complaint box will be kept in a place where everyone can see.</p> <p>To address the grievances that can be resolved immediately by studying the grievances received.</p> <p>Complaints of complex situations will be addressed within 15 days.</p> <p>Complaints and disputes with locals will be resolved through coordination between the two parties.</p>	Hospital	Establishment of Grievance Redress Cell	Operation phase	Proponent	Included in chapter 8	MoFE, MoHP, DoEnv, Tansen Municipality
Groundwater Management Plan							
Recharge pit will be kept	Use of recharge pit	Hospital area	build of recharge pit	Operation phase	Proponent	Included in chapter 8	MoFE, MoHP, DoEnv, Tansen Municipality
Rainwater harvesting technology will be used	Collection of rain water	Hospital area	Installation of rainwater harvesting technology	Operation phase	Proponent		

Chapter 9 : Environmental Monitoring Plan

Monitoring in a systematic and standardized manner helps in assessment of current environment and provides information on operational performance of installed pollution control facilities and activities. The environmental monitoring plan designed for the project has three main objectives;

- To ensure that the project baseline conditions were adequately documented such that a comparative evaluation of the project baseline before and after commencement of the project could be made precisely for impact evaluation
- To ensure minimizing the adverse impacts and maximizing the beneficial impacts is actually implemented by the project or not so
- To verify that the project impacts were within the limits of the EIA impact prediction or some unforeseen impacts also occurred during project development and what measures were taken to minimize the unforeseen impacts

Taking into account of the above objectives and procedures three types of monitoring are envisaged in the plan, namely: Baseline Monitoring, Compliance Monitoring and Impact Monitoring. Since the required databases for the environmental baseline are already collected by the EIA study, the project need not envisaged to require baseline monitoring. Table 9-1 presents compliance monitoring plan and table 9-2 presents impact monitoring plan in a matrix format showing monitoring indicators, monitoring methods, development phase and frequency of monitoring of the various environmental parameters during construction and operation phase of the proposal implementation. The proponent will conduct self monitoring of proposal at every 6 month during construction and operation phase to identify the impact on environment and report will submit to concerned agency and department.

9.1 Baseline Monitoring

Baseline monitoring is the part of EIA, which collects the environmental baselines of the project impact area before the construction of project. The hospital is already in operation so does not require baseline monitoring plan.

9.2 Compliance Monitoring

The main purpose of compliance monitoring in EIA process is to provide the information required to ensure that the project in compliance with commitments made in EIA study. The compliance monitoring employs a periodic sampling or continuous recording of specific environmental indicators or pollution levels, to ensure project compliance with the recommended environmental standards. The compliance monitoring plan is given in table 9-1.

9.3 Impact Monitoring

In order to detect the environmental changes caused by the implementation of the proposal, the indicators of environmental, social and economic conditions including the public health of the area are evaluated during the operation of the project.

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Table 9-1: Compliance Monitoring Plan

Parameter	Indicators	Methods	Duration	Monitoring Frequency	Responsible Agency	Monitoring Agency
Physical Environment						
Implémentation of EIA recommandation regarding design and facilites in the hospital	Incorporation of EIA recommandation in to Project document, design of infrastructure	Review of detail design project, specification and tender documents	Operation phase	Once after the project design and completion of tender documents	EMU	MoFE, DoEnv, MoHP, Tansen Municipality
Compliance to environmental protection measures, including pollution prevention, water ,soil protection, waste management	Dust level and noise at construction site , neighbouring households and labourers; fuel, smell; PM10,SPM; Noise level	Observation , review of records, measurement, discussion with workers , monitoring using Noise meter	Operation phase	Quarterly	EMU	MoFE, DoEnv, MoHP, Tansen Municipality
Ambient air quality	Foul smell, PM ₁₀ , PM _{2.5} , Suspended particulate matter	measurement and review of records	Operation phase	Half Yearly	EMU	MoFE, DoEnv, MoHP, Tansen Municipality
Solid waste management	Observation during segregation and transportation	Use of separate colour coded dustbins	Operation phase	Weekly	EMU	MoFE, DoEnv, MoHP
Waste water management	Water quality parameter of STP effluent	Sampling, lab testing and comparing with generic standard	Operation phase	Yearly	EMU	MoFE, DoEnv, MoHP, Tansen Municipality
Water quality parameter	Water quality parameter	Sampling, lab testing and comparing with NDWQS	Operation phase	Twice in year (half Yearly)	EMU	MoFE, DoEnv, MoHP
Noise level	Generator	Direct measurement in dB (A) at	Operation phase	Half Yearly	EMU	MoFE, DoEnv, MoHP, Tansen Municipality

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		different points in different time zones using Sound level meter				
Separate management for health care waste and other wastes like radioactive and sharps	Observation and hospital report review	Collection, disinfection and destroying systems	Operation phase	Daily monitoring and follow the instructions as given by concerned authority	EMU	MoFE, DoEnv, MoHP, Tansen Municipality
Awareness training, emergency preparedness	Number of trainings and lists of participants	Observation, interview with staff and public, checking hospital records	Operation phase	Twice in a year(Half Yearly)	EMU	MoFE, DoEnv, MoHP, Tansen Municipality
				Twice in a year (Half Yearly)	EMU	MoFE, DoEnv, MoHP, Tansen Municipality
Biological Environment						
Greenery and landscaping design with parking area	Observation of open space /area allocated	Observation	Operation Phase	Half Yearly	EMU	MoFE, DoEnv, MoHP
Socio-economic and cultural environment						
Employees to locals	Number of locals working	Inspection and interviewing with staffs	Operation phase	Yearly	EMU	MoFE, DoEnv, MoHP, Tansen Municipality
Occupational health and safety measures	Use of safety equipment/tools Regular health check-ups	Review of records and interaction with workers/ staffs	Operation phase	Half Yearly	EMU	MoFE, DoEnv, MoHP, Tansen Municipality
Use of child labour and Gender violence	Individuals working Complains related to gender violence	interviewing; inspecting hospital records	Operation phase	Quarterly	EMU	MoFE, DoEnv, MoHP, Tansen Municipality
Free health services to poor and needy peoples	Number of peoples given free health services	Inspecting hospital record	Operation phase	Half Yearly	EMU	MoFE, DoEnv, MoHP, Tansen Municipality

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Formation of waste management committee	Document record	Review of records and minuting	Operation phase	Half Yearly	EMU	MoFE, DoEnv, MoHP, Tansen Municipality
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Table 9-2: Impact Monitoring Plan

Parameter	Indicators	Methods	Monitoring Frequency	Monitoring Agency	Responsible Agency
Physical Environment					
Solid waste management	Types and quantity of wastes and their management practices, complaints from the local bodies	Inspection, Use of separate colour coded dustbins	Weekly	MoFE, DoEnv, MoHP, Tansen Municipality	EMU, Proponent
Management of healthcare wastes	Types and quantity of waste and their management practices	Inspection and check records	Weekly	MoFE, DoEnv, MoHP, Tansen Municipality	EMU, Proponent
Separate management for health care waste and other wastes like radioactive and sharps	Observation and Hospital report review	Collection, disinfection and destroying systems	Daily	MoFE, DoEnv, MoHP, Tansen Municipality	EMU, Proponent
Waste water	Different physio-chemical parameter (like turbidity, temperature, DO, BOD, hardness etc.)	Sampling and laboratory analysis	Half yearly	MoFE, DoEnv, MoHP, Tansen Municipality	EMU, Proponent
Water quality for hospital use	Different physio-chemical parameter (like turbidity, temperature, DO, BOD, hardness etc.)	Sampling and laboratory analysis	Quarterly	MoFE, DoEnv, MoHP, Tansen Municipality	EMU, Proponent
Air quality	TSP, PM 10 etc.	Measurement by High volume sampler	Half yearly	MoFE, DoEnv, MoHP, Tansen Municipality	EMU, Proponent
Noise level	Noise level	Sound level measurement	Half yearly	MoFE, DoEnv, MoHP,	EMU, Proponent

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				Tansen Municipality	
Disaster risk management system	Awareness to staff, Information system to public, provision of fire extinguisher and stocking of water for fire fighting, Open space for rescuing.	Observation, interview with staff and public, checking hospital records	Yearly	MoFE, DoEnv, MoHP, Tansen Municipality	EMU, Proponent
Biological Environment					
Development of Green area and landscaping	Developed green area and land scalping	Observation	Yearly	MoFE, DoEnv, MoHP, Tansen Municipality	EMU, Proponent
Socio-economic and cultural environment					
Local employment	Number and types of local employees	Review of records	Yearly	MoFE, DoEnv, MoHP, Tansen Municipality	EMU, Proponent
Occupational health and safety measures	Accidents and complaints record	Review of records	Yearly	MoFE, DoEnv, MoHP, Tansen Municipality	EMU, Proponent
Free health services to poor and needy peoples	Number of peoples given free health services	Inspecting hospital record	Yearly	MoFE, DoEnv, MoHP, Tansen Municipality	EMU, Proponent
Facilitation to local business	Number of suppliers	Review of procurement	Yearly	MoFE, DoEnv, MoHP, Tansen Municipality	EMU, Proponent

9.4 Monitoring Cost

Environmental management unit will be responsible for internal monitoring. The cost allocated for environmental monitoring for every year is presented in table 9-3.

Table 9-3: Monitoring Parameter and Cost

S.N.	Monitoring Parameter	Frequency	Unit rate (NRs.)	Total (NRs.)
1	Air quality	2 times per year	50,000.00	100,000
2	Waste water quality	2 times per year	50,000.00	100,000
3	Water quality	4 times per year	15,000.00	60,000
4	Noise quality	2 times per year	30,000.00	60,000
5	Miscellaneous			80,000
	Total yearly cost			400,000

Note: Based on current market price

Chapter 10 : Environmental Auditing

The basic objective of project performance audit reports include a final assessment of the degree to which the project satisfied the proposed environmental requirements, the effectiveness of mitigation measures and institutional development and whether any unanticipated effects occurred as a result of project activities. In combination with the baseline information, impacts predicted and mitigation proposed records of both the development and operation phase as per requirement are the main documents to be used for the environmental auditing.

The audit planning of the proposal will involve following steps:

- Formation of audit team
- The audit team collects the secondary information with regard to the project, including EIA reports and regular front line monitoring reports.
- The audit team review the literatures and national environmental requirements for the proposal
- The audit team inform the proponent on the audit of the proposal and any information it requires from the proponent for audit
- The audit team visits the proposal site, records of environmental monitoring (front line monitoring) and observe directly the proposal activities and their impacts
- The audit team interact with the local people, proposal managers, members of proposal Integrated Environmental Management System
- Audit team returns from field visit and prepare audit report and presents the report to the concerned agencies, Department of Environment and the proponent.

10.1 Types of environmental auditing

The different types of environmental auditing are:

- Decision level audit
- Implementation audit
- Work effectiveness audit
- Planning impact audit
- Assessed technology audit
- Environmental Impact Assessment Process audit

10.2 Environmental audit usually involves three aspects:

- Examiner
- The tested party
- Third party

10.3 Environmental auditing may be internal or external, depending on the party or organization involved in voluntary or binding test:

- Internal auditing
- External auditing

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- Mandatory auditing
- Voluntary auditing

Ministry of Forests and Environment or prescribed body will conduct environmental auditing within 6 month after completion of 2 years of the commencement of service. The proponent will also conduct internal environmental auditing in which an amount of NRs. 6, 00,000 is allocated.

Table 10-1: Environmental Auditing framework

Parameter	Indicator	Location	Methods	Sources
Physical Environment				
Land use change	Construction of hospital building , blocks, generator site etc.	Hospital building site	Observation	Observation and photographs and records from hospital
Solid waste management	Collection bin, foul smelling around hospital	In and around the hospital site	Observation	Records, local information, photographs, information from hospital
Waste water management	Order and color of waste water	Collection site, drainage	Observation, analysis	Local people, photographs, observations
Air and noise pollution	Emission of dust and air pollution noise pollution	Hospital site and generator site	Observation, interview and measurement	Local information, photographs, observations
Energy use	Installation of alternative energy solar system, generator	In the roof top of the hospital and generator site	Observation and inspection	Photographs, interview and records
Parking and traffic management	Congestion around the hospital site	Parking site	Observation, interview	Photographs, interview and records
Emergency preparedness	Installation of fire hydrants, sprinklers and fire extinguisher and emergency exit	In the hospital and floor	Observation, interview	Photographs, interview and records
Use of ground water	Amount of ground water withdrawal and rain harvesting system	In the hospital site	Observation and inspection	Photographs, interview and records
Earth quake and disaster	Earth quake resistance building	Hospital building	Observation and analysis	Records from structural and architectural drawing
Biological Environment				
Urban biodiversity	Greening and gardening	Allocated area	Observation and interview	Local people, available information, photographs, and

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				observation
Socio-economic and Cultural Environment				
Employment opportunity	Nos. of local labors employed during project Operation time	In the Hospital	Interview and records	Records, local people, records from hospital
Skill Development	Nos. of training conducted and employment in post project	In the Hospital	Interview and records	Records, local people, records from hospital
Occupational Health and safety	Incident of accident and injuries to the labor and local	In the Hospital	Interview and records	Local people, records from hospital
Awareness training on emergency preparedness	Number of trainings and list of participants	In the Hospital	Records and interview	Records from hospital

Chapter 11 : Conclusion and Commitment

11.1 Conclusion

The operation of United Mission Hospital Tansen will have beneficial impacts at local level, regional as well as in the national level. The main aim of establishment of this hospital is to provide quality health services to the people. The proposed project will have number of beneficial impacts but also have few adverse impacts too. The EIA study has predicted and outlined the beneficial impacts and the adverse impacts as well. The adverse impacts are considered nominal as compared to the beneficial impacts. The benefit augmentation measures for beneficial impact and mitigation measures for adverse have been proposed in this EIA report.

The United Mission Hospital Tansen does not locate in the environmental sensitive area and have minimal detrimental effects associated with air/noise pollution and traffic congestion. Most of the adverse impacts predicted are of low and short term. The hospital will provide modern treatment facilities with latest technology. In addition, people will get direct employment during operation of hospital, which will improve livelihood the people.

Therefore, it is recommended to establish and operate the proposal with due consideration and implementation of all the recommended mitigation measures. The Environment Management Plan and Environmental auditing is given in this report. The project will implement proposed argumentation measures so that the proposal will bring more benefits to the environment as well as human. Any activity is not effective without proper monitoring, so monitoring plan is also given in this report. The proponent has also allocated cost for environmental enhancement, mitigation, monitoring and auditing activities.

11.2 Commitment

- The total land area of the hospital will be at least 55 square meter per bed.
- Self monitoring will be conducted at every 6 month during operation phase to identify the impact on environment and report will be submitted to concerned agency and department.
- Environmental Management Unit will be established within hospital
- Grievance redress unit will be established in hospital to resolve complains
- Infection control mechanism will be arranged in the hospital as per the criteria set by WHO and it will be monitored regularly and effectively
- The hospital will keep the available schedule (days and times) of specialist doctors or other doctors providing outpatient services in a visible place
- Patient charter will be displayed on the front of the hospital with the fee, procedure and duration of the patient receiving the service from the hospital
- Inquiry and help desk will be arranged to provide necessary information
- The hospital will be senior citizen, child and disability friendly

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- Digital technology equipment will be used in the hospital instead of mercury based equipment
- Waste discharged from the hospital will be managed as prescribed by the Solid Waste Management Act, 2068 BS and Solid Waste Management Rules, 2070 BS.
- An environmental management unit with environmentalist will be arranged to regularly monitor the work related to the management of medical waste discharged from the hospital
- Disaster Management Plan will be prepared for the information of the public in the hospital building and safety signs will be clearly displayed in appropriate places.
- The hospital building will be equipped with anti-lightening technology. Fire extinguisher, fire reel hole, smoke detector, auto fire alarm etc. will be installed for fire control.
- Free treatment will be made compulsory for the needy and helpless patients coming to the hospital for treatment by allocating ten percent of the total beds and the report will be sent to the Public Health Office regularly.
- Separate entrances and exit will be arranged in hospital for entry and exit
- Pharmacy will be established within hospital periphery as per Pharmacy Service Directive, 2070
- Complaint box will be kept in hospital in a visible place
- Tree plantation and gardening will be maintained in the hospital premise for a healthy environment

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