

**INITIAL ENVIRONMENTAL EXAMINATION (IEE)
of
Reconstruction and Refurbishment of DHM Office
Building
of
Department of Hydrology and Meteorology**

Kathmandu Metropolitan City, Ward no.-11

Submitted to:

Government of Nepal
Ministry of Urban Development
Singhdurbar, Kathmandu

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ABBREVIATIONS/ACRNYMS

ADB	: Asian Development Bank
CBS	: Central Bureau of Statistics
DDC	: District Development Committee
DO	: Dissolved Oxygen
EIA	: Environmental Impact Assessment
EMP	: Environment Management Plan
EPA	: Environment Protection Act
EPR	: Environment Protection Regulation
FAR	: Floor Area Ratio
GoN	: Government of Nepal
ha	: Hectare
Kg	: Kilogram
KUKL	: Khanepani Upatyaka Khanepani Limited
KVA	: Kilo Volt Ampere
KVTDC	: Kathmandu Valley Town Development Committee
Lpm	: Liter per Minute
Lps	: Liter per Second
LS	: Lump Sum
Ltd	: Limited
MBT	: Main Boundary Thrust
MFT	: Main Frontal Thrust
MOE	: Ministry of Environment
MoEST	: Ministry of Environment, Science and Technology
NBC	: National Building Code
NLSS	: Nepal Living Standard Survey
NRs	: Nepalese Rupees
NWSS	: Nepal water Supply & Sewerage Corporation
Pvt	: Private
RCC	: Reinforce Cement Concrete
SMRF	: Special Moment Resistance Frames
SPT	: Sewage Treatment Plant
Sqm	: Square Meter
ToR	: Terms of Reference
VDC	: Village Development Committee

जल तथा मौसम विज्ञान विभाग, बबरमहल, काठमाडौंको प्रारम्भिक वातावरणीय परिक्षणको कार्यकारी सारांश

पृष्ठभूमि

काठमाडौं महानगर, बबरमहल क्षेत्रमा अवस्थित जल तथा मौसम विज्ञान विभागको भवन निर्माणको प्रस्तावक जल तथा मौसम विज्ञान विभाग, नक्साल, काठमाडौं रहेको छ । जल तथा मौसम विज्ञान विभाग अन्तर्गत सन्चालित जलवायु प्रकोप् समुत्थान् निर्माण आयोजनाको कार्यहरु मध्ये विभागको अत्याधुनिक सुविधासम्पन्न भवन निर्माण पनि एउटा कार्य हो। नेपाल PPCR द्वारा सहयोग गरिएको ४ आयोजना मध्य जल तथा मौसम विज्ञान विभाग पनि एक हो । यस आयोजनाको मुख्य उद्देश्य बबरमहलमा नया अत्याधुनिक प्रवृत्तिको, वातावरणीय मैत्री तथा हरित निर्माण प्रकृयाद्वारा निर्माण सम्पन्न गर्नु हो ।

वातावरण संरक्षण ऐन, १९९७ (परिमार्जन, १९९९) ले वातावरण संरक्षण नियमावली, १९९७ को अनुसूची-१ मा उल्लेख भएका कुनै पनि परियोजनाको कार्यान्वयन गर्दा प्रारम्भिक वातावरणीय परिक्षण गरेर मात्र योजना कार्यान्वयन गर्नु पर्ने बाध्यात्मक कानुनी व्यवस्था गरेको छ ।

योजनाको विवरण

जल तथा मौसम विज्ञान विभागको प्रस्तावित भवन निर्माण बबरमहल, काठमाडौंमा अवस्थित छ । यस प्रस्तावित आयोजना क्षेत्र तथा सिंहदरबार , नेपालको मुख्य प्रशासनिक क्षेत्र वरिपरि नेपाल सरकारको विभिन्न केन्द्रिय तथा जिल्ला निकायको कार्यालय एवम् विभिन्न संघ संस्था, वाणिज्य बैंक, विमा कम्पनी लगायत निजी स्तरका कार्यालयहरु रहेका छन् । प्रस्तावित आयोजनाले बबरमहलको २२,४५६.८ वर्ग फीट क्षेत्रफलमा कार्यान्वयन हुने भएको छ जसमध्ये ११,२२८ वर्ग फीट अफिसको भवनको लागि प्रयोग हुनेछ । आयोजना कार्यान्वयन हुन लागेको जमीन नेपाल सरकारको रहेको छ । त्यस क्षेत्रमा उपयुक्त सेवा सुविधा जस्तै बाटो, विद्युत, ढल व्यवस्थापन, खानेपानीको सुविधा हरु उपलब्ध छ । यस प्रस्तावित भवनमा कुल क्षेत्रफल ५६२५.६७ वर्ग मीटर छ जुन ५ तलाको हुनेछ र यो भवन निर्माण गर्न कुल लगानी ३४,००,८३,६३८ ने.रु हुनेछ ।

मौजुदा वातावरणीय अवस्था

भौतिक वातावरण

प्रस्तावित योजना रहेको जमिनको भाग प्रायः समथर नै रहेको छ । नेपालको राष्ट्रिय भवन संहिता अनुसार काठमाडौं उपत्यका भूकम्पीय क्षेत्रमा पर्ने हुँदा प्रस्तावित भवन योजना पनि सोही क्षेत्रमा पर्दछ । उक्त आयोजनाको जमीन कार्यालयको भवनले ओगेटेको छ जुन भवन नवनिर्माणको बेलामा भत्काइनेछ । यो क्षेत्रमा मुख्यतया विभिन्न सरकारी तथा निजी कार्यालय एवम् प्रशासनिक कार्यालयहरु रहेका छन् । भवन निर्माण योजना क्षेत्र फराकिलो बाटोले शहरी सडक सञ्जालसँग जोडिएको छ । त्यस क्षेत्रको मौसम तथा भौगोलिक अवस्था काठमाडौं उपत्यकाको जस्तै रहेको छ । यस आयोजना क्षेत्र को वरिपरि कुनै मुख्य पानीका श्रोतहरु रहेका छैनन् । प्रस्तावित क्षेत्रमा विद्युत, ढल, खानेपानी, संचार आदिको सुविधा रहेको छ ।

जैविक वातावरण

यस योजना क्षेत्र भित्र कुनै प्रजातिको वनस्पतिको उपस्थिति देखिदैन । जोखिमपूर्ण अवस्थामा रहेका चराहरु, जीवजन्तु, उभयचर र घस्रने जनावरहरु यस प्रस्तावित कार्यालय क्षेत्र वरिपरि देखिदैनन् । योजना क्षेत्र भित्र जलचरहरुको उपस्थिति पनि देखिदैन ।

सामाजिक-आर्थिक र सांस्कृतिक वातावरण

सन् २०११ को जनगणना अनुसार काठमाडौं महानगरपालिका वडा नं. ११ को जनसंख्या १७,७६५, जसमा पुरुष ९,५८९, महिला, ८,१७६ र घरधुरी ४,४१६ रहेको छ । यस वडामा बसोबास गर्ने मुख्य जातिहरुमा क्षेत्री नेवार, राई, बाहुन, तामाङ, आदि छन् । प्रायः हिन्दु, केही बौद्धिष्ट र नगण्य संख्यामा क्रिश्चियन लगायतका

धर्मालम्बीहरूको यहाँ बसोबास रहेको छ । प्रायः जसो मानिसहरु नोकरी, व्यापार व्यवसाय र मजदूरी लगायतका पेशामा लागेका पाइन्छन् । यहाँ यथेष्ट भौतिक तथा सामाजिक पूर्वाधारहरु उपलब्ध छन् । केही स्थानीय मन्दिरहरु पनि यस वडामा रहेका छन् ।

वातावरणीय प्रभावको पहिचान, मूल्याङ्कन र भविष्यवाणी

राष्ट्रिय वातावरणीय प्रभाव मूल्याङ्कन निर्देशिका, १९९३ को निर्देशन बमोजिम वातावरणीय प्रभाव मूल्याङ्कन गरिएको छ । जसअनुसार वातावरणीय प्रभावको आकार, क्षेत्र र समय अवधिलाई ध्यान दिई प्रभाव मूल्याङ्कन गरिएको छ । वातावरणीय प्रभाव ३ वर्षसम्म रहनेलाई छोटो अवधिको प्रभाव र २० वर्षसम्म रहने प्रभावलाई मध्यम स्तरीय प्रभाव र २० वर्ष भन्दा माथि रहने प्रभावलाई लामो समयको प्रभाव भनि वर्गिकरण गरिएको छ । प्रत्येक पहिचान भएका वातावरणीय प्रभावहरूका लागि निराकरणका उपायहरु प्रस्ताव गरिएको छ ।

भौतिक वातावरण

भवन निर्माण योजनाको कार्यान्वयनले गर्दा भौतिक वातावरणमा सकारात्मक र नकारात्मक दुवै प्रभाव पर्ने देखिन्छ । नकारात्मक प्रभावहरूलाई प्रस्ताव गरिएका वातावरणका न्युनिकरणका उपायहरूद्वारा सजिलैसँग निराकरण गर्न सकिन्छ ।

सामाजिक-आर्थिक र साँस्कृतिक वातावरण

प्रस्तुत भवन निर्माण गर्नको लागि ठूलो संख्यामा कामदारहरूको आवश्यकता पर्दछ । जसले स्थानीय स्तरमा रोजगारीको अवसर प्रदान गर्दछ । प्राविधिक, प्रशासनिक र मार्केटिङ जस्ता दक्ष जनशक्तिको आवश्यकतामा पनि योग्यता अनुसार स्थानीय स्तरको जनशक्तिलाई प्राथमिकता दिने नीति लिइने छ । कार्यालय निर्माण गर्न विभिन्न प्रकारका निर्माण सामग्रीहरु जस्तै: सिमेन्ट, बालुवा, गिट्टी, काठ, फलामे छड, विजुलिका सामान, धाराका सामान, रङ्गरोगन आदि आवश्यक पर्दछ र उक्त मालसामानहरु स्थानीय बजारमै खरिद गरिने हुँदा स्थानीय स्तरमा आर्थिक गतिविधिहरु समेत बढ्ने देखिन्छ । स्थानीय स्तरका प्लम्बर, ईलेक्ट्रिसियन र प्राविधिकहरु यस योजनामा काम गर्दा उनीहरूको शिप र क्षमतामा अभिवृद्धि हुने विश्वास समेत लिईएको छ ।

जैविक वातावरण

प्रस्तावित कार्यालय निर्माण योजनाले जैविक वातावरणमा खासै उल्लेखनीय नकारात्मक प्रभाव पर्ने देखिदैन । प्रस्तावित योजनाको निर्माणले वर्तमान अवस्थामा खाली रुपमा रहेको जमीनलाई निर्मित जमीनको रुपमा परिवर्तन गर्ने छ ।

फाईदाजनक प्रभावहरु

निर्माण चरण

स्थानीय स्तरमा रोजगारीको अवसर तथा स्थानीय कामदार र प्राविधिकहरूको क्षमतामा बृद्धि

प्राविधिक टोलीको साथसाथै दक्ष, अर्धदक्ष र अदक्ष कामदारहरूको निकै ठूलो मात्रामा आवश्यकता पर्ने हुनाले स्थानीय स्तरमा रोजगारीको अवसर प्रदान गर्ने देखिन्छ । भवन निर्माण कार्यमा सहभागी हुदा स्थानीय कामदार र प्राविधिकहरूको क्षमतामा अभिवृद्धि हुन जाने देखिन्छ । स्थानीय स्तरका प्लम्बर, ईलेक्ट्रिसियन र प्राविधिकहरु यस योजनामा काम गर्दा उनीहरूको शिप र क्षमतामा अभिवृद्धि हुने विश्वास समेत लिईएको छ ।

व्यापारका अवसरहरु

आयोजनाको निर्माण गर्दा निकै ठूलो मात्रामा विभिन्न प्रकारका निर्माण सामग्रीहरु जस्तै: सिमेन्ट, बालुवा, गिट्टी, काठ, फलामे छड, विजुलीका सामान, धाराका सामान, रङ्गरोगन आदि आवश्यक पर्दछ र उक्त मालसामानहरु स्थानीय बजारमै खरिद गरिने हुँदा स्थानीय स्तरमा आर्थिक गतिविधिहरु समेत बढ्ने देखिन्छ ।

संचालन र मर्मतसंभार चरण

व्यवस्थित कार्यालय सुविधा

प्रस्तावित कार्यालयको भवन निर्माण योजनामा आधुनिक सुविधाहरु जस्तै योजनाबद्ध पार्किङ सुविधा, कार्यालय सुरक्षा सेवा, आपत्कालीन विद्युत ब्याकअप, अग्नि नियन्त्रण, लिफ्ट आदि उपलब्ध गराइनेछ ।

नकारात्मक प्रभावहरु

निर्माण समय

आयोजनाको निर्माण समयमा भौतिक वातावरणका अवयवहरु जस्तै भूदृश्यमा असर, निर्माण कार्य गर्दा निस्कने धुँवा धुलोले हावाको गुणस्तरमा असर, सतही पानीको उचाईमा असर, ध्वनि प्रदुषण बढाउने, कामदारद्वारा विर्सजन हुने फोहरमैलाको व्यवस्थापन, सवारीको व्यवस्थापन, खानेपानीको व्यवस्थापन आदिमा असर पर्ने अनुमान गरिएको छ ।

कार्यालय भवनको संचालन र मर्मतसंभार अवस्था

प्रस्तुत योजनाको संचालन र मर्मतसंभारले गर्दा भौतिक वातावरणमा भूमिगत जमीनको पानीको उचाई कम हुने, आयोजनाबाट विर्सजन हुने फोहरमैलाको व्यवस्थापन, स्वास्थ्य र सुरक्षामा प्रभाव, सतही ढलको व्यवस्थापन, सवारीको व्यवस्थापन, खानेपानीको माग र व्यवस्थापन आदिमा प्रभाव पर्ने देखिन्छ । त्यसै गरी जैविक वातावरणमा खालि जमीनको विनाश हुने देखिन्छ ।

विकल्पको विश्लेषण

विकल्पको विश्लेषण प्रारम्भिक वातावरणीय परिक्षणको एक अभिन्न अंग हो । खास गरी विकास आयोजनाहरुको सम्भाव्यता अध्ययन आर्थिक लगानीका अवसर र वातावरणीय दिगोपनको लागि विकल्पहरुको विश्लेषण गर्ने गरिन्छ । प्रस्तुत संयुक्त आवास योजनाको १) डिजाईन २) आयोजना स्थल र ३) प्रविधि व्यवस्थापन, समय र निर्माण सामग्रीको सम्बन्धमा विकल्पको विश्लेषण गरिएको छ ।

निराकरणका उपायहरु

प्रस्तावित कार्यालय निर्माण योजनाको कार्यान्वयन गर्दा राष्ट्रिय स्तरका र स्थानीय स्तरका नीति, नियम, निर्देशिका, कोड आदिको अनुसरण गरिने छ । प्रस्तावित आवास योजना कार्यान्वयन गर्दा वातावरण सम्बन्धी नीति नियम र कानूनको कडाईका साथ पालना गरिने छ । यो प्रारम्भिक वातावरणीय परिक्षण प्रतिवेदनले निर्माण योजना कार्यान्वयन गर्दा उत्पन्न हुने वातावरणीय प्रभावहरुको मूल्याङ्कन गरी प्रत्येक प्रभावको न्यूनिकरणका उपायहरु प्रस्ताव गरिएको छ ।

वातावरणीय व्यवस्थापन योजना

वातावरणीय व्यवस्थापन योजना प्रारम्भिक वातावरणीय परिक्षणको अभिन्न अंगको रूपमा रहेको छ । वातावरणीय प्रभाव मूल्याङ्कनको मुख्य उद्देश्य नै न्यूनिकरणका उपायहरुको रणनीति तयार गरी आयोजनाको निर्माण र संचालनको समयमा वातावरणीय प्रभावहरु कम गर्नु हो । वातावरणीय प्रभावहरु कम गर्न प्रस्ताव गरिएका न्यूनिकरणका उपायहरुको कार्यान्वयन सुनिश्चित गर्न संस्थागत संरचना, कर्मचारी, समन्वय, रिपोर्टिङ र बजेटको व्यवस्था गरी वातावरण व्यवस्थापन योजना तर्जुमा गरिएको छ । प्रस्तावित भवन निर्माण योजनाबाट प्राप्त हुने सकारात्मक प्रभावहरुलाई अधिकतम रूपमा उपयोग गर्न र प्रतिकूल प्रभावलाई न्यून गर्न वातावरण अनुगमन तथा परीक्षण सम्बन्धि कार्यहरुको लागि ५ क (के, कसरी, कहाँ, कहिले र कसले गर्ने) लाई समेटि वातावरणीय व्यवस्थापन योजना तयार गरिएको छ । वातावरणीय व्यवस्थापन योजनाको कुल लागत ९४०,००० रुपैया हुनेछ ।

उपसंहार र सुझावहरु

वातावरण संरक्षण ऐन र वातावरण संरक्षण नियमावलीबाट जारी गरिएका ऐन, नियम र निर्देशिकाहरुको कडाईका साथ पालना गरी यो प्रारम्भिक वातावरणीय परिक्षण प्रतिवेदन तयार गरिएको छ । प्रस्तुत प्रारम्भिक वातावरणीय परिक्षण प्रतिवेदनले वर्तमान भौतिक, जैविक र आर्थिक, सामाजिक तथा सांस्कृतिक वातावरणमा सकारात्मक र नकारात्मक प्रभाव पर्ने कुरा औल्याएको छ । नकारात्मक प्रभावहरु प्रायः अल्पकालीन स्तरका छन् र प्रस्ताव गरिएको न्यूनिकरणका उपायहरुबाट सजिलै कम गर्न सकिन्छ । त्यसैले वातावरणीय व्यवस्थापन योजनालाई राम्रोसँग कार्यान्वयन गर्दै प्रस्तुत आयोजना कार्यान्वयन गर्न उपयुक्त देखिएको छ ।

EXECUTIVE SUMMARY OF INITIAL ENVIRONMENTAL EXAMINATION (IEE) OF OFFICE BUILDING OF DEPARTMENT OF HYDROLOGY AND METEOROLOGY, BABARMAHAL, KATHMANDU

Background

Department of Hydrology and Meteorology, Naxal, Kathmandu is the proponent of **Initial Environmental Examination (IEE)** study for building construction of Department of Hydrology and Meteorology located in Kathmandu Metropolitan City. Building Resilience to Climate Related Hazards (BRCH) is one of the four projects funded through the Nepal Pilot program for Climate Resilience (PPCR) under the Strategic Climate Fund. One of the objectives of the component B is to refurbish DHM offices and facilities. The project has aims to construct a new well equipped, environment friendly, green building at Babarmahal.

Environmental Protection Act, 1997 (Amendment, 1999) obliges the proponent to conduct Initial Environmental Examination for the projects which fall under the category of Schedule -1 of EPR.

Description of the Proposal

Proposed building of DHM is situated in Babarmahal, Kathmandu. Various offices of central and district line agencies of Government of Nepal as well as offices of Commercial Bank, Insurance and other private companies are located in the vicinity of the DHM building and Singhdurbar, administrative headquarter of Nepal. The project will be implemented in an area of 22,456.8 sq.ft of land in Babarmahal, out of which 11,228 sq. ft. shall be used for office building. The land belongs to Government of Nepal. All required basic amenities like motorable road, electricity, sewerage, water supply etc are available on the site. Total built up area of the building will be 5625.67 sq. m., 5 storey and total project cost will be Nrs.34,00,83,638.1.

Existing Environmental Conditions

Physical Environment

The Project site is located in generally flat area. According to the National Building Code of Nepal, the Kathmandu Valley falls under the Seismic Zone "A". The land is occupied by DHM with office building, which will be dismantled for the construction of new building. This is mainly the administrative area with various government and private offices. It is well connected with city road network. Climate and geology of the area is same of Kathmandu valley. No major water sources are there in nearby area of the project site. Electricity, sewerage, drinking water supply, communication facilities are available in the project site.

Biological Environment

No major vegetation is found in the project site. Similarly, no endangered species of birds, reptiles, and amphibian were seen in the project area. No aquatic life exists within the project periphery.

Socio-economic & Cultural Environment

The population of the ward no. 11 of Kathmandu Municipality as per census 2011 is 17,765 and is constituted by 9,589 male and 8,176 females living in a total of 4,416 households (*Source: CBS, 2011*). Major ethnic groups residing in this ward are Newar, Brahmin, Chhetri. Most of the people are engaged in occupations like trade and business, service and others. Some temples of local importance are also located in this ward. The proposed Building Site is

located near to the Singhdurbar, main Administrative block of Government of Nepal. So it will be higher movement of peoples in the surrounding area of proposed project sites.

Identification, Prediction and Evaluation of Environmental Impacts

Environmental impacts were evaluated on the basics of guidelines given in the National EIA guidelines 1993, based on the 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 is considered as Long term (LT). The mitigation measures for each of the identified impact have been proposed.

Physical Environment

There will be minimum impact to the existing physical environment due to the construction of building. Little adverse impacts shall occur at the time of construction and operation & maintenance of the building, but can be easily managed by mitigation measures.

Socio-economic & Cultural Environment

Large numbers of worker are required to construct the project. Thus the project will generate employment opportunity to the local people as well. The technical, administrative and marketing person shall also be given opportunity as per their qualifications. The project requires large quantities of different type of construction materials such as cement, sand, aggregate, wood, steel reinforcement, electrical fittings, sanitary fittings, enamel paints etc. The workers shall be getting experience to work in high-rise buildings and their skill shall be enhanced. The skill of the plumber, electrician as well as technical staffs shall be also enhanced due to exposure in this the project.

Biological environment

No significant impact has been seen in the biological environment. Limited open space shall be converted into built up area.

Beneficial Impacts

Construction stage

Employment opportunities and Capacity Built-Up of technical Staffs

Besides technical team, a large number of skilled, semi-skilled and unskilled workers are required to complete the project. The construction of which would be of different technology from the general construction of small housing units. The local workers shall be getting experience to work in high-rise towers and their skill shall be enhanced.

Increased trade and business opportunities

The project requires large quantities of different type of construction materials such as cement, sand, aggregate, wood, steel reinforcement, electrical fittings, sanitary fittings, enamel paints etc. The cement mixer, wheel barrow, pulleys, scaffoldings etc. shall also be hired from local market.

Operation and Maintenance stage

Office facility for DHM

The project is to be developed with the all modern facilities required for the functioning of DHM like Planned Parking facilities, Twenty four hour Security Service, Emergency Electrical backup, Fire-fighting, Lifts etc. all in a well planned way, the place will become

better place to work in.

Adverse Impacts

Construction stage

During construction stage, identified and predicted adverse impacts in physical environment are landscape disturbance, decline in air quality due to dust, emissions of gases in construction activities, impact on height of ground water table, noise pollution, management of solid waste generated by construction workers, traffic management, drinking water supply etc.

Operation and Maintenance stage

During operation and maintenance stage of the project, predicted impacts on physical environment are decline in ground water table, management of solid waste generation, impact on health and security, management of surface drainage, traffic management. Similarly, there is permanent loss of open land under biological environment.

Alternative Analysis

Alternative analysis is an integral part of the IEE report. The Alternative analysis for the development project is carried out for assessing the Technical feasibility, Economic viability and the Environmental sustainability of the project. The Alternative Analysis of this building project has been done in three aspects 1) Design 2) Project site & 3) Technology Management methods, schedule, required raw materials.

Mitigation Measures

The project shall adhere with National Building Code of the Nepal. The project shall strictly adhere with the National Rules, Regulation and Guidelines for the protection of the environment. This IEE study has analyzed the environmental issues and predicted the environmental impacts and suggested Mitigation Measures for each of the identified impacts.

Environmental Management Plan

An Environmental Management Plan (EMP) is an important part of IEE report. The purpose of IEE is to identify, predict and evaluate impacts of the project on the environment and to formulate mitigation strategies to minimize adverse impacts that are likely to occur during the project implementation and operation. In the process of IEE, the formulation and implementation of an EMP lays the framework for continued assessment of potential impacts through the application of monitoring Plan. An Environmental Management Plan has been proposed with necessary organization, manpower and budget. A sum of Nrs 940,000.

Conclusion & Recommendations

The study fully complies with the Nepal Government Rules, Regulations and Guidelines and strictly follows the IEE procedures prescribed by the EPA and EPR. The IEE study has found beneficial and some adverse impact to the existing physical, biological and socio-economic environment. Most of the adverse impacts identified in the study are of temporary natures and they will easily be mitigated through the proposed mitigation measures. With sincere implementation of mitigation measures and EMP the project will be successfully implemented.

Chapter 1: Name and Address of Institution Preparing the Report

1.1 Introduction

Department of Hydrology and Meteorology, Naxal, Kathmandu is the proponent of **Initial Environmental Examination (IEE)** study for building construction of Department of Hydrology and Meteorology located in Kathmandu Metropolitan City. The proponent, with the help of its Environmental Consultant is responsible for the study of Initial Environmental Examination (IEE) as per the prevailing legal requirements. The full address of the proponent is as follows:

Full Address of Proponent:

Department of Hydrology and Meteorology Nagpokhari, Naxal, Kathmandu, Nepal P. Box No. :406, Naxal, Kathmandu, Telephone: 01-4433477, Fax: 977-01-4429919 E-mail: dg@dhm.gov.np, ppcr.brch@dhm.gov.np Website: www.dhm.gov.np

1.2 Institutional Responsibility for Preparing IEE Report

Creative Designers Associate Kupandole has been entrusted by Department of Hydrology and Meteorology, Naxal, Kathmandu for undertaking the IEE of “Building Construction of Department of Hydrology and Meteorology’. Thus, the consultant has studied the area and prepared this report.

The contact address of consultant is as follows:

Creative Design Architects Pvt. Ltd.
Kupandole, Lalitpur
GPO 8975 EPC 1539
Tel: 5545293, Fax: 016209374
E-mail: sher_kc@yahoo.com, info@cedanepal.com
URL: www.cedanepal.com

Chapter 2: General Introduction

2.1 Background

GoN has prepared a Strategic Program for Climate Resilience (SPCR), which was approved by Climate Investment Fund (CIF). SPCR, Nepal identified five projects for investment. Building Resilience to Climate Related Hazards (BRCH) is one of the four projects funded through the Nepal Pilot program for Climate Resilience (PPCR) under the Strategic Climate Fund. The main objective of the BRCH project is to enhance government capacity to mitigate climate related hazards by improving the accuracy and timeliness of weather and flood forecasts and warnings for climate-vulnerable communities, as well as developing agricultural management information system services to help farmers mitigate climate-related production risks. This would be achieved by establishing multi-hazard information and early warning systems, upgrading the existing hydro-meteorological system and agricultural management information system, and enhancing capacity. Activities funded through the project would help improve decision-making and planning in key climate vulnerable and water resources dependent sectors particularly agriculture, health, water and disaster management, and contribute to building climate resilience for communities at risk. The BRCH project became effective in June 2013 and is currently under implementation.

RCH project is coordinated by MoSTE (Ministry of Science, Technology & Environment) and implemented by the Department of Hydrology and Meteorology (DHM) and the Ministry of Agricultural Development (MoAD). The World Bank is supporting implementation of the project. The project comprises following four components:

- a) Institutional strengthening, capacity building and implementation support of DHM;
- b) Modernization of observation networks and forecasting;
- c) Enhancement of the service delivery system of DHM; and
- d) Creation of an agriculture management information system (AMIS).

DHM is responsible for the implementation of Components A, B and C and MoAD is responsible for implementing Component D (i.e. Creation of AMIS). For detailed information on the BRCH Project please refer to the Project Appraisal Document (link: <http://documents.worldbank.org/curated/en/2012/12/17116662/nepal-building-resilience-climate-related-hazards-project>)

One of the objectives of the component B is to refurbish DHM offices and facilities. The project has aims to construct a new well equipped, environment friendly, green building at Babarmahal.

2.2 Project Description

Department of Hydrology and Meteorology (DHM)

Government of Nepal started hydrological and meteorological activities in an organized way in 1962. The activities were initiated as a section under the Department of Electricity. The section was subsequently transferred to the Department of Irrigation and was ultimately upgraded to Department status in 1988.

The Department of Hydrology and Meteorology (DHM) is an organization under the Ministry of Environment, Government of Nepal. The department with headquarters in Kathmandu has

three basin offices: Karnali Basin Office in Nepalgunj, Narayani Basin Office in Narayanghat and Kosi Basin Office in Biratnagar. Meteorological activities in the Far Western and Mid-Western region are managed by a regional office in Surkhet, whereas such activities in the Western Development Region and the Eastern Development Region are managed by meteorological regional offices located in Pokhara and Dharan respectively.

DHM has a mandate from Government of Nepal to monitor all the hydrological and meteorological activities in Nepal. The scope of work includes the monitoring of river hydrology, climate, agrometeorology, sediment, air quality, water quality, limnology, snow hydrology, glaciology, and wind and solar energy. General and aviation weather forecasts are the regular services provided by DHM.

As a member of World Meteorological Organization (WMO), DHM contributes to the global exchange of meteorological data on a regular basis. DHM actively participates in the programs of relevant international organizations, such as, the UNESCO's International Hydrological Program (IHP) and WMO's Operational Hydrology Program (OHP). In the past, DHM has hosted several regional and international workshops, symposia, seminars and meetings on different aspects of meteorology, hydrology, sediment, water quality and snow hydrology. The department is also a focal point for the Intergovernmental Panel on Climate Change (IPCC) and for the meteorological activities of the South Asian Association for Regional Co-operation (SAARC). International Civil Aviation Organization (ICAO) has recognized DHM as an authority to provide meteorological services for international flights.

DHM has the responsibility of weather forecast requiring a well-equipped studio that can deliver and disseminate daily weather forecast to national and international electronic and printing media. Along with this, it requires advanced RADAR which can receive signals of rainfall, flood, climate change and disaster causing other facts for a land locked country like Nepal. For this matter, there is a need of environment friendly structures with sufficient space, which can energize the working human resources as well as entice them to work longer hours. DHM is planning to build a new Office building by demolishing existing one at Babarmahal, Kathmandu with financial and technical support of PPCR project and by developing the modern hydro-met information disseminating system of DHM to its stakeholder.

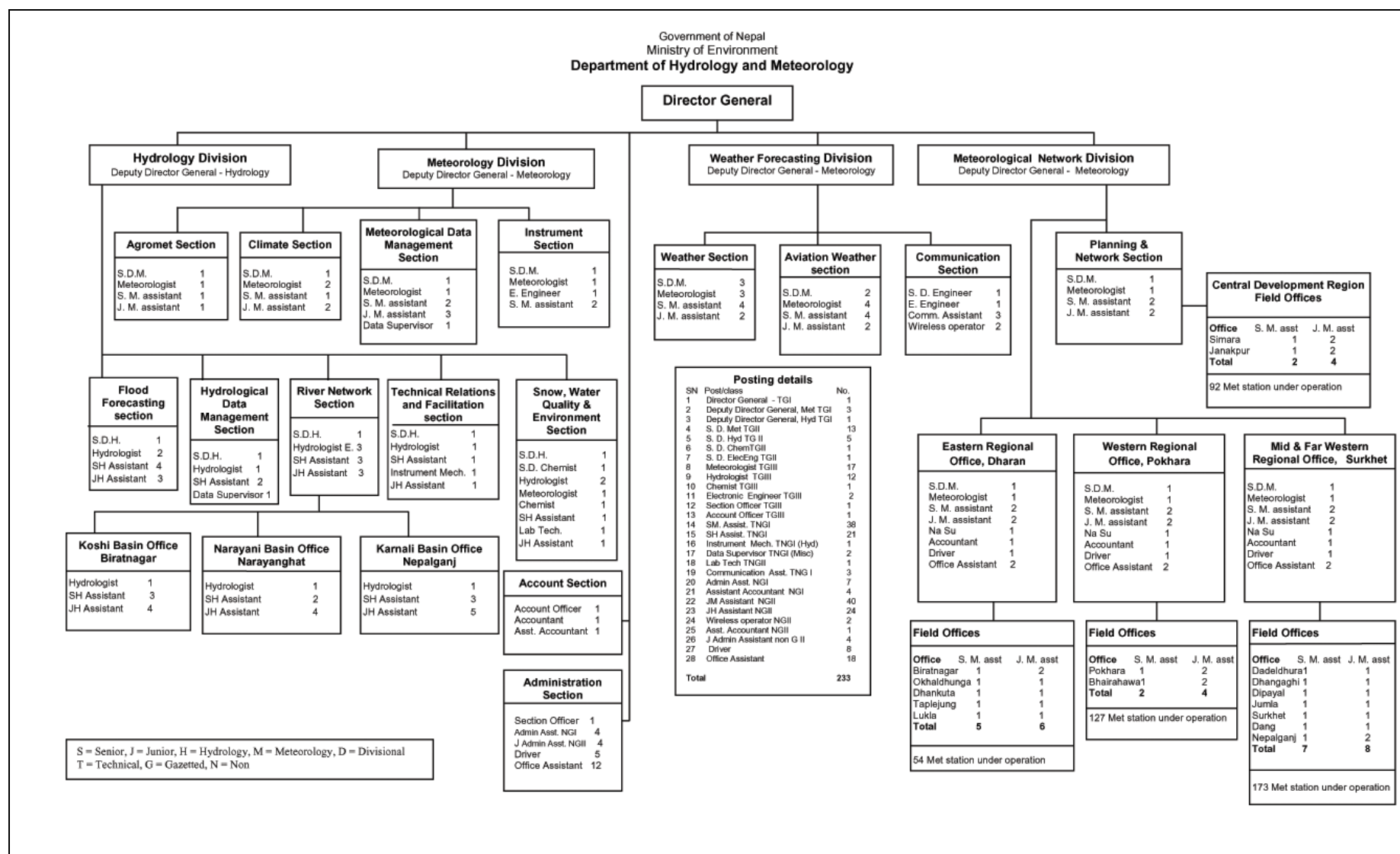
The Principal Activities of DHM

- Collect and disseminate hydrological and meteorological information for water resources, agriculture, energy, and other development activities.
- Issue hydrological and meteorological forecasts for public, mountaineering expedition, civil aviation, and for the mitigation of natural disasters.
- Conduct special studies required for the policy makers and for the development of hydrological and meteorological sciences in the region.
- Promote relationship with national and international organizations in the field of hydrology and meteorology.

Organizational Structure of DHM

DHM is the only department of Government of Nepal working in hydrological and meteorological issues with two hundred thirty three working staff headed by Director General and four Deputy Director Generals. It has four Divisions, five regional offices, three basin offices and thirteen sections with more than five staff in each section. The existing space in the decades-old building is not sufficient to accommodate all staff and lodge emerging

technology. BRCH project is going to expand DHM's field of activities for which the existing setup is inadequate. Organizational structure of DHM with various division and section is shown in the figure below:



S = Senior, J = Junior, H = Hydrology, M = Meteorology, D = Divisional
T = Technical, G = Gazetted, N = Non

Figure 1: Organizational Structure of DHM

2.3 Project Location

Kathmandu Metropolitan City, the capital, is also the center of administration, business and education and modern health services. Babarmahal area, situated near administrative headquarter of the Nepal, is, now being developed as administrative centre of Kathmandu. Various offices of central and district line agencies of Government of Nepal as well as offices of Commercial Bank, Insurance and other private companies are located in the vicinity of the DHM building. Some of notable offices in the area are District Administration Office, Kathmandu, District Court, Kathmandu, Department of Food Technology and Quality Control (DFTQC), Department of Roads, Civil Aviation Authority of Nepal, Head office of NMB Bank and others. Due to these offices, movement of people and traffic are intense in the surrounding area.

The proposed Office building of Department of Hydrology and Meteorology will be located in Kathmandu Metropolitan City- 11, Babarmahal. The proposed location is connected via Akhtiyar Marg followed by Tank Prasad Ghumti Marg of Babarmahal area. The proposed location could be reached from the 200 m from southeast from the Hanumansthan Temple and attached with the existing District Court of Kathmandu District. It is situated in between two offices, District Court Kathmandu and Department of Food Technology and Quality Control. The project will be implemented in an area of 22,456.8 sq ft .of land in Babarmahal, out of which 11,228 sq. ft shall be used for office building. The land belongs to Government of Nepal. It is an ideal location for the office building due to proximity of Singhdurbar and other important government offices. All required basic amenities like motorable road, electricity, sewerage, water supply etc are available on the site.

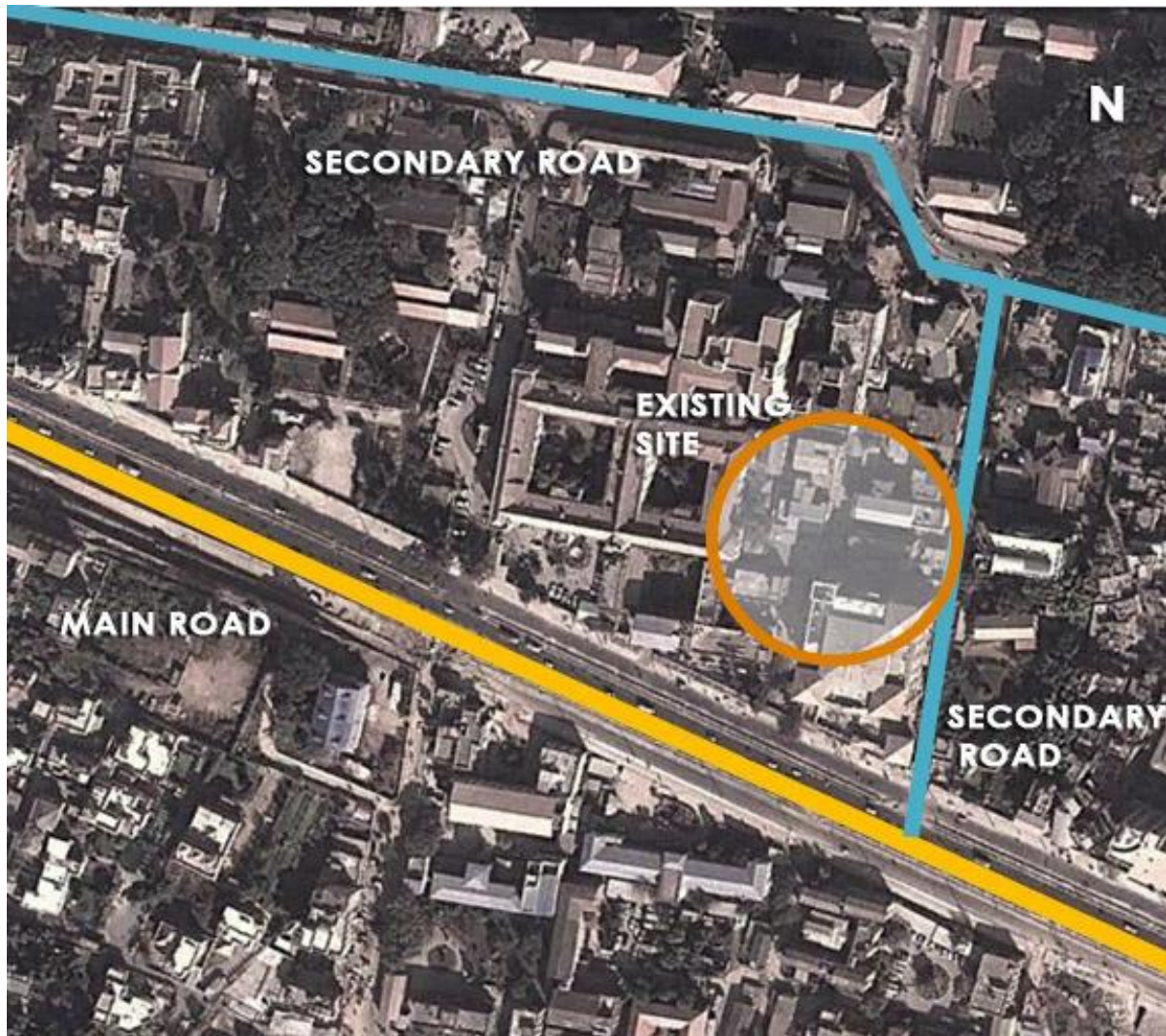


Figure 2: Proposed Location of DHM

The project will use land occupied by its existing building. It is around 100m inside the Kathmandu District Court opposite of NMB bank.

2.4 Relevancy of the Proposal

Government of Nepal statutory requirement that has to adhere to far the environmental assessment, whether it is EIA or IEE, for any type of development activities as detailed in the EPA-1996, EPR-1997 with amendments. Under the act, it is also made mandatory to suggest and recommend the suitable mitigation measures for the control and management of the environment ensuring a minimum deterioration due to the result of the project implementation. Above all, environment monitoring program and its plan for the implementation is also equally important.

The environment assessment requirements are clearly defined and explained about the scope of IEE study for the projects in the National Legislation of Government of Nepal, EPA-1997 and EPR-1997 Clause E (with amendment) which state

1. Construction of residential, commercial and their combination building having Built-up area or Floor area greater than 5000square meter and up to 10000 square meters requires IEE
2. Construction of Cinema Hall, Theatre, Community Hall, Stadium, Concert Hall, Sport Complex with capacity of entrance and exit ranging from 1000-2000 people at once.
3. Development ranging area from 1 ha to 4 ha.
4. Implementation of land development project ranging area from 10 ha to 100 ha.
5. Construction of hard surface pavement area greater than 10 ha (i.e. Dry Port, Bus Park, Parking Lot etc).
6. Site development work by cutting or filling more than 20,000 cubic meter of soil.
7. Construction of building ranging from 10 storeys or 20 meter high to 16 storeys or 50 m high building.

It is relevant to identify the complications in the environmental condition along with the favorable impacts resulting from the activities associated with the project over the physical, biological, socio-economic and cultural environment of the project area. Similarly the assessment of the magnitude of the impacts is also equally important. The EPR 1997 (with modifications, 2007 & 2008) has clearly mentioned the threshold for the proposals requiring IEE in schedule -1.

Table 1: Threshold value for the project requiring IEE based on National Legislation of GoN (EPA-1996, EPR-1997)

Threshold Particulars for IEE	Threshold Value	Actual Value	Range
Total built up area	5000 to 10000 sq. m.	55,394 sqft	within
Number of storey and height of Building	10 to 16 storey	5	Below
Land development	1 to 4 hectare land development	22,456.8 sqft	Below

The proposal falls within the threshold mentioned in the Schedule 1 clause E 1 and 7, hence the proposal requires IEE.

2.5 Objectives of the Proposal

The main objectives of the IEE study as stated by EPR and EPA is to enhance the beneficial impacts and to minimize the adverse effects as minimum as possible in the project site. The specific objective of the proposal includes:

- Identify the extent of environmental problems that occurs during the construction, maintenance and operational phase.
- Identify the significant environmental issues /concern (physical, biological, and socio-economic, cultural) that can arise from construction and implementation activities.
- Recommend practical and site specific environmental mitigation measures and prepare environmental mitigation measures.

Chapter 3: Description of Proposal

3.1 Type of Proposal

DHM building is located in Kathmandu Metropolitan City-11, Babarmahal. It is situated in between two offices District Court Kathmandu and Department of Food Technology and Quality Control. The project will be implemented in an area of 22,456.8 sq ft of land in Babarmahal, out of which 11,228.4 sq. ft. shall be used for office building. The land belongs to Government of Nepal. It is an ideal location for the office building due to proximity of Singhdurbar and other important government offices. This building falls under the Other Residential Zone of Kathmandu Valley. All required basic amenities like motorable road, electricity, sewerage, water supply etc are available on the site.

The construction, maintenance and operation of this building will be under Nepal Government.

3.2 Salient features of the proposal

Salient features of the proposal is given below:

Table 2: Salient features of the project

Item	Description	
Project Name	Construction of Office Building for Department of Hydrology and Meteorology	
Location	Babarmahal	
Plot Area	22,456.8 sqft	
	Permissible	Actual
Ground Coverage	50% (11,228.4 sqft)	28.7% (6,445.1 sqft)
Permissible Built Up Area	44,913.5 sqft	
Type of Building	RCC Frame Structure	
FAR	2.0	
Parking	31 cars	
Basement Area (Parking)	15,967 sq ft	
Total Built Up Area	5625.67 sq. m Incl. non countable area	
Total number of storey	10	
Proposed green area	30% (626.11sq.mtr)	
Proposed road + parking area	30% (626.11sq.mtr)	
Total Ground coverage area	38.9% (812.01 sq.mtr)	
Total number of car parking	52	
Total number of bike parking	60	
Total number of bicycle parking	80	
Number of block	1	
Type of construction	Matt foundation and RCC structure	
Construction material	Cement, Reinforcement bars, pre-fab, Aluminium,glass etc	

Height of Building	30 mtr
No. of Lifts	1 nos.
Access Road	Main access 6m wide
Water tank capacity	2 lac liter Cum raw water + treated water
Set Back	3m min. in the front, 3m min. on east, west and south
Other	24 hour electrical backup system, water treatment plant, fire tank, geothermal tunnel, 24hour security service, solar panels etc.
Cost	Nrs 34,00,83,638

Source: Design Report, 2015

Engineering Design

The planning & engineering design follows all the rules, regulations and directives of the Nepal National Building code and all the rooms are also constructed according to government building rules and regulations. Details of the engineering design are explained in the following headings.

Architectural Design

This project deals with the construction of new building design of Department of Hydrology and Meteorology situated at its original location i.e. Babarmahal, Kathmandu, Nepal. This Building will be completely different from the past architecture and has been described as “Green building”.

This building is targeted to incorporate the modern day office building with sensitivity towards environmental issues, like natural lighting and natural ventilation. It also takes advantage of its existing environment by incorporating it into the function of the building.

The building brings together the principles of the bio-climatic approach to the design of tall buildings developed over the previous decade in Nepal.

Concept Development:

The Building is an environmental filter and analogy for synthesis and analysis. The building is carefully planned in the site according to the detailed site analysis and its existing environment. Main ideas and concepts for this building:

- Building Orientation
- Seasonal window considerations
- Passive Solar Design
- Central Courtyard system
- Day lighting
- Passive Cooling
- Ventilation
- Micro climates
- Passive Heating (Geo thermal earth tunnelling)
- Rain water harvesting
- Green Roof

- Solar Photovoltaics
- Dual flow wcs / dry urinals
- Porous paving permeable
- Rain water Harvesting

The Building shape and layout is render according to the surrounding environment and also the sun path and prevailing wind direction of the Valley. It will stand dialogue between the internal and external environment. The building will be 10 stories tall and rest of the building part stood 4 stories high giving a freedom in shape. The tower housed executive function and the rest of the part contains office space facilitated by the central court as well vertical gardens.

Central Courtyard is a base to connect the landscape providing visual relief for office workers as well as providing continuity of space connecting the land through the building. The environment in the court remains without noise pollution and helps workers to get desired peaceful environment. The courtyard concept itself is a prominent space in Traditional Newari Architecture of Kathmandu.

Structural Design

The analysis and design has been based on IS1893-2002 and IS456:2000.

Type of Structure: RCC Moment Resisting Frame.

DESIGN CODES AND STANDARDS:

- IS875 part 1, Code for design loads in building and structure
- IS 875 part 2, Code for design Imposed loads in building and
- IS1893-2002, Code of practice for design of Seismic Resistant Concrete structures.
- Design of Reinforced Concrete Structure – IS456:2000
- Ductility design for earthquake resistant structure IS13920

STRUCTURAL ELEMENT DESCRIPTIONS & ASSUMPTIONS:

- The building is a Office building with spaces for office rooms and equipment for Hydrology and Meteorology stations.
- All the external / peripheral walls are made of 230 mm or thicker walls.
- The foundation of the building is designed as Mat foundation and Two different thickness as per requirement.
- The main beams rest centrally on the columns to avoid local eccentricity. The beams are 950mm x 400mm, 700mm x 300mm, 600mm x 300mm and 450mm x300mm.
- The columns in the upper floors are kept same similar to that of the lower storey.
- The columns sizes are: Rectangular 800mm x 600mm and 600mm x 600mm etc.
- Seismic loads shall be considered acting in the horizontal direction (along either of the two principal direction) and not along the vertical direction.
- The loads distributed over the area are imposed on area element and that distributed over length are imposed on line element whenever possible. Where such facility is not feasible, equivalent conversion to different loading distribution is carried to load the Model near the real case as far as possible.

LOADING PARAMETERS:

a) Dead Load:

Comprises of all the self weight of all the components of the building each floor wise

Average load of Exterior wall on all frame in floors = 15.0 kN/m

Average load of partition wall on all frame in floors = 8.0 kN/m

Average load of partition wall on all frame in roofs = 0.25 kN/m

Unit weight of Materials:

Reinforced Concrete = 24.5 kN/m³

Brick Masonry = 20.0 kN/m³

Unit Weight of Soil = 16.0 kN/m³

Super imposed Load = 3.0 kN/m²

b) Live Load: For rooms, bathrooms, toilets = 3.0 kN/m²

For staircases, corridors and passages = 5.0 kN/m²

c) Wall Load: As per the weight of the brick wall. About 15% of the weight is decreased for the openings, as applicable.

d) Floor Finish: 40 mm Screeding & Punning $[= 40/1000 \times 25 \text{ kN/m}^3 = 1.0 \text{ kN/m}^2]$ As per the unit weight of Screeding & Punning materials = 25 kN/m³

e) Partition Load: As *Half brick masonry wall* = 3.2m [Fl. Ht] x (0.115+.02) [Wall thickness including plaster] x 20kN/m³ = 8.64 \approx 9.0 kN/m²

f) Seismic Load: As per the recommendation and guide lines provided in IS1893-2002

DESIGN OF STRUCTURAL ELEMENTS:

The design for components like Mat, columns and beams are carried out with the help of software STAAD.pro Vi8 and STAAD foundation and relevant Indian Codes 456- 2000.

FOUNDATION DESIGN:

The design of the foundation is as per of IS456. The cross checked is done for punching shear, maximum moment manually. Allowing bearing capacity of the soil has been assumed as 72.03 kN/m². (In reference to **Soil Investigation report**) Furthermore, the lateral walls are also designed to take the earth bearing pressure as well as the lateral seismic movements. Though the shear wall decreases the stiffness

COLUMNS:

Columns are designed with the help of STAAD. Each column was designed for the total vertical load coming on to the individual column. The percentage of steel is checked as per limit governed by IS 456. The stirrup area is checked for the spacing provided. This shall enable to resist all the shear all the staircase has been governing. Apart from that this also assisted in decreasing the percentage of rebar in the columns. The spacing of stirrups is as per the requirement of seismic criteria given in seismic code and seismic detailing code. Also lapping and any other detailing requirement of IS13920 is followed.

BEAMS:

Beams are designed with the software STAAD considering the reversible effect due to the seismic force. The most critical value of seismic force of all possible direction has been considered. The shear stirrups are designed as per the requirements and instruction of code and area of the stirrups are checked for provided spacing. The spacing of the stirrups is governed by the seismic detailing requirements. The input loads of Columns, grade Beam and their corresponding outputs are as below with Slab calculations.

Geology and Foundation system

The design of the foundation is as per of IS456. The cross checked is done for punching shear, maximum moment manually. Allowing bearing capacity of the soil has been assumed as 72.03 kN/m². (In reference to **Soil Investigation report**) Furthermore, the lateral walls are also designed to take the earth bearing pressure as well as the lateral seismic movements. Though the shear wall decreases the stiffness of the building, only 25% decrement in the lateral loads are considered while analyzing the building. The seismic design of the residential building is done as per IS1893-2002 Codes and IS. The Dead and Live Load of the building is taken as per the IS875. The seismic load is as per IS1893 by seismic co-efficient method and the response spectrum method is assigned to the analysis and design software STAAD.

The analysis of the 3-D model after assigning all the dead, live and seismic load is done in STAAD. And also the design of each and every member of column and beam as well as the foundation is done from the STAAD using IS456. The other detailing rules for column, beam, foundation and the beam column junction etc concerning the stirrups size, spacing, lap length, confining of joints are done as per the IS139208 for ductile design. After design of all members, the structural drawings are drawn as per design and other detailing rules for earthquake resistant building. Hence safe, stable and economical seismic design of the building is done.

The basic services include:

- Water supply system
- Sanitation /Sewage System
- Electrical system
- Fire Detection and Alarm System
- Fire Fighting system
- Rain water harvesting system
- Solar panels for solar energy for electricity.
- Geothermal tunnel for natural ventilation system
- Double glazing window system.

3.3 Materials Used

Raw materials used for building construction will have brick, cement, tiles, paints, varnish, and mild steel rods, deformed steel bar and wire for concrete reinforcement, galvanized steel and PVC pipes for water supply.

3.4 Waste generation due to proposal implementation

No huge amount of waste is generated as it is government office. However, waste generated from labs and office will be managed.

Solid Waste

The forms of solid wastes will be biodegradable and non-biodegradable which will be generated from the proposal implementation. The degradable solid waste may spread different types of diseases if allowed to decay at the open space for a long time.

The building shall coordinate with Kathmandu metropolitan City (KMC) for the disposal of waste effluents from the building. The effective measures shall be taken for the disposal of waste from the building keeping in mind the environment impact.

Wastewater discharge

Sewerage treatment plants (STP) containing anaerobic digester followed with aerobic filter plant and bio-filter will be provided. Soil and waste water will be lead through different pipes to the manholes at ground and further lead through a simple PVC pipes. Effluent from STP will be recycled for gardening and excess water will be disposed to municipal drainage system. Adequate surface drainage shall be provided for storm water collection. Storm water will be reused after treatment and excess storm water will be recharged to underground through deep and shallow well system.

3.5 Manpower Requirement

During the construction period, about 370 people will be employed. All of them will be employed on contract basis until the completion of proposal. Whilst, security guards, electrician and gardener will be entitled as temporary or permanent employee based on mutual agreement with the proponent, the expected number of such employee will vary from 4 – 6 persons.

3.6 Proposal implementation requirement**Total investment**

The expected total investment for the proposal is NRs. 340 million.

Machinery equipments

Types of machines and equipments required for proposal construction are Concrete pump, Excavator, loader, Mixer machine, Vibrator, Hoisting machine, Concrete testing machine, compressor, Jeep and trucks respectively.

Others

Since the nature of product is service oriented, it requires transformer, generator, fire extinguisher, lifts, and smoke control devices as the major equipments to be installed for service delivery to the families of unit holders.

3.7 Study Area and Study Area Delineation

The study area covers areas of Ward-11 of KMC. For the consideration of the study, the areas which are within 100 m from the boundaries of the farmhouse have been defined as the Zone of Influence (ZoI). Among this, the areas which are within 50m distance from the project are considered as Direct ZoI whereas the areas beyond the Direct ZoI and upto 100m distance are considered as Indirect ZoI

3.7 Baseline Environment Condition

3.7.1 Physical Environment

Topography and Land Use

The present proposal is construction and operation of the DHM office building at Kathmandu Metropolitan City ward No: 11, Kathmandu District. The elevation of the project site lies at 1317 masl. There are no unique, fragile or difficult topography, elevations and slope characteristic to this area.

Existing land used around the proposal site is completely built up area. As it lies within the urban area, other form of land use such as farmland, forest or protected areas are not identified. Thus, the overall scenario of land use within the direct impact area is described as below.

Direction	Current Land Use	Remarks
East	NMB Bank	
West	Groundwater Resource Development Committee	
North	Department of Food Technology and Quality Control	
South	Kathmandu District Court	

Climate

Kathmandu has a temperate monsoon climate. It has a hot and mild summer and warm and cool winters with temperature around freezing point during January. It has dry and warm season from Mid-April to Mid-June and rainy season during mid-June to Mid-October, dry, cold season during Mid-October to Mid-January and cold and wet season from Mid-January to Mid-April.

Climatic condition will be considered in the design of the building. Annual air temperature, sunshine hour wind speed humidity rain fall shall be considered in the design. Especially; the orientation, solar chart and wind control to reduce discomforts shall be taken into account in the design. From the previous record, we find the climatic details to be as:

Air Temperature

Average Max -	25.91 degree Celsius
Average Min -	13.48 degree Celsius
Average annual rainfall-	1900 mm

The aesthetic of the local architecture is primarily based on the climate and geographic location. The prevailing local aesthetics shall be considered in the design of the building.

Geology

The central Nepal Himalaya, as observed throughout the entire range, is tectonically divided into three different zones: Higher Himalaya, Lesser Himalaya, and Sub Himalaya. Upreti and Le Fort

have recognized two different thrust packages in the Kathmandu transect. According to them, two crystalline nappe units named as Kathmandu Crystalline Nappe (KCN) and Gosainkund Crystalline Nappe (GCN) are separated from each other by the Main Central Thrust (MCT) which passes to the north of the Kathmandu basin. The GCN unit, which corresponds to the southward continuity of the Higher Himalayan Crystallines of the Langtang area, is brought southward along the MCT. South of the MCT, the KCN unit is thrust over the narrow zone of the Lesser Himalayan meta sediments along the Mahabharat Thrust as an out of sequence thrust sheet in the Lesser Himalaya.

The Kathmandu valley is a large intermontane basin carried above the Himalayan major detachment and it is the largest basin situated in the Lesser Himalaya of Nepal. It occupies the central portion of the nearly elliptical KCN towards the northern margin. It is limited southward by the Mahabharat Range, which forms the hanging wall of the Mahabharat Thrust (MT), and northward by the Shivapuri range, which belongs to transported sheet of the Higher Himalayan crystalline towards south along the MCT. This basin lies on the basement of crystalline rocks and Precambrian to Paleozoic meta sedimentary formations. It covers a part of the Mahabharat Synclinorium. It extends for about 30 km in the east-west direction and about 25 km in the north-south direction and has an almost circular shape. A lake is known to have filled most of the basin from Pliocene to Pleistocene age. The basin is filled with a very thick (more than 650m) sequence of fluvio-lacustrine sediments (Moribayashi and Maruo, 1980) that covers about 400 km² area. The drilling data shows that the thickness of sediment at Hyumat Tole at Kalimati, Bhrikutimandap, Bansbari, Gausala and Katunje are 504m, 550m, 79m, 113m, and 160m respectively. In this centripetal drainage basin, sediments were derived from the crystalline (schist, gneiss, pegmatite) and meta sedimentary (phyllite, siltstone, shale, meta sandstone and limestone) rocks. The semi consolidated sediments filling the basin mainly consist of muds, silts, sandy loam, fine to coarse sands, and gravel to cobble conglomerates.

Many faults (main trend WNW-ESE) have been mapped that crosscut the meta sedimentary basement. Previous studies have revealed the presence of geomorphic and structural features indicative of active faults including young fault scarps and displaced lacustrine sediments. In the south west part of the basin, NW/SE trending faults (Chobhar Fault, CF, and Chandragiri Fault, CGF) have been traced for about a length of 3-4 km and have contributed to the formation of the Kathmandu basin and the upliftment of the Mahabharat Range since Late Quaternary time.

Moribayashi and Mauro (1980) conducted gravity survey in Nov. 1976 with 112 gravity stations to understand the basement topography of the Kathmandu Basin and concluded that the maximum depth of the basement below the sediments is a little more than 650 m. Judging on the basis of the borehole data of different agencies and the rock outcrops within the valley the basement contour map prepared by Moribayashi and Mauro (1980) fairly reflects the objective reality. The basement rock depth in the investigated area is around 400-450m from the ground. Geologically, Kathmandu valley is a synclinal tectonic basin consisting of fluvio-lacustrine deposit of Pleistocene age resting on the Precambrian metamorphic bedrock. In the North side of the valley, there is a thick formation of fluvial overburden whereas the South part of the valley comprises dominantly of lacustrine deposit formed by the mechanical and chemical weathering of rocks of surrounding hills of the valley. The products of the weathering were transported by various agencies and the weathering products finally were deposited on the bed of the lake. In

general, the clay layer is capped by occasional sand and silt sedimentary layers. The clay deposit is occasionally organic in nature and is compressible. Organic content in the clay/silt layer increases with depth.

The project site lies at the interface of Kalimati Formation and Gokarna formation consisting of slightly consolidated sediments. It also consists of light to brownish grey, fine laminated and poorly graded silty sand with intercalation of clay of variable thickness. The thickness of the formation is as thick as 300 m at places.

Hydrology

The annual basin rainfall in the project area averages about 1900 mm of which 80% rain falls between June and September during the monsoon. Bagmati River and its tributaries, originating in the Mahabharat hills undergoes considerable seasonal fluctuation. This affects water availability during the winter months. There are almost 20 small rivers and rivulets in Kathmandu Valley. The project area lies in Bagmati river watershed, one of the major rivers in the Kathmandu valley. The latest available data of temperature, rainfall and humidity at the nearest meteorological station (Panipokhari) are given in the table below:

Table 3: Temperature, Rainfall and Humidity Data at Panipokhari Station, Kathmandu (2014)

MONTH	T _{MAX}	T _{MIN}	RAIN	RHM
January	19.3	3.8	0.0	84.3
February	23.7	8.0	0.0	85.7
March	25.7	9.0	22.5	84.2
April	28.1	10.8	129.8	85.6
May	28.2	16.6	165.7	87.9
June	29.7	19.9	190.6	88.2
July	29.1	20.7	394.8	87.8
August	28.8	20.5	441.1	88.2
September	27.9	19.2	275.2	88.2
October	27.3	15.3	20.4	87.4
November	22.3	10.0	0.0	87.9
December	20.9	8.0	23.1	84.2
Grand Average	25.91	13.48	138.6	86.63

The total annual runoff of the Bagmati River at Chobhar, the outlet point, is estimated to be approximately 500 million cubic meters; with a mean annual flow is about 15.5 m³/s between 1963 to 1980. The maximum mean monthly average discharge of 53.4 m³/s occurs in August and the minimum of 1.55 m³/s (1339.2 million liter/day) in March.

It appears that the average discharge over four months of the Bagmati at Sundarijal and Nakhu River at Tika Bhairav is similar (Table 3).

Table 4: Average monthly discharge (m³/s) of Rivers in the Valley

Parameters	Bagmati Sundarijal	Bishnumati Budhanilkantha	Nakhu TikaBhairav	Bagmati Chobhar
Average	1.07	0.46	1.09	15.5

Absolute maximum	8.82	1.92	35.98	254.4
Absolute minimum	0.13	0.01	0.01	0.3

Source: MOPE, 1999

1 m³/s= 86.4 million liter/day

Air Quality

The major sources of air pollution in the site are vehicular emissions, dust particles from unpaved footpaths. According to the Ministry of Science, Technology and Environment (MoSTE), vehicular emissions have become the main source of air pollution in the Kathmandu Valley. An inventory of emission sources by the MoSTE has shown that vehicular emission covers 43% of the total PM₁₀ concentration in the valley. The National Ambient Air Quality Standard Value (NAAQS) for PM₁₀ has been set as 120 ug/m³ Annual average concentration of PM₁₀ for residential area was 149 ug/m³ in 2003 and it reduced to 117 ug/m³ in 2006 NAAQS.

Table 5: Comparison of emission inventories in 1993, 2001 and 2005

Sources	TSP (tons/year)			PM ₁₀ (tons/year)		
	1993	2001	2003	1993	2001	2005
Mobile sources						
Vehicle exhausts	570	1971	NA	570	3,259	4,708
Road dust re-suspension	1530	7008	239	400	1822	3182
Sub-total	2100	8979	12,239	970	5,081	7,890
Stationary Sources						
Industrial/commercial fuel	582	NA	NA	292	NA	NA
Domestic fuel combustion	2328	NA	630	1,166	NA	NA
Brick kilns	5180	6676	1850	1,295	1,688	1,437
Stone crushers	NA	NA	1720	NA	NA	372
Industrial boilers	NA	28	28	NA	15	15
Fugitive Emissions						
Refuse burning	385	687	172	190	339	172
Agricultural sector	NA	NA	NA	NA	NA	2,337
Cremation	NA	NA	158	NA	NA	79
Total	16,575	19,984	16,797	3,913	7123	12,302

Key: TSP = Total Suspended Particles; NA=Not available

Source: Shag and Nepal 1997; Gautam 2006; MoSTE

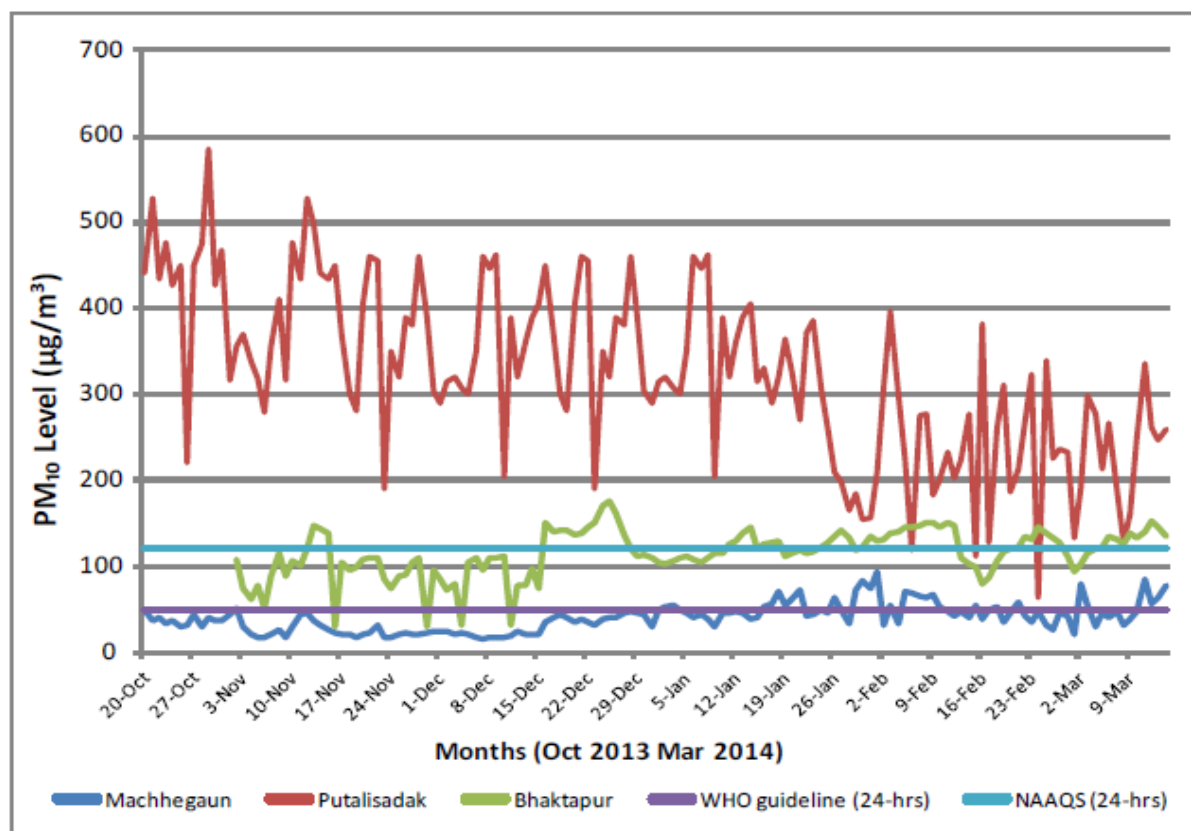


Figure 3: PM10 Level in different location of Kathmandu Valley

Source: MoSTE 2014

Solid Waste Management

Solid waste generation in the 11 ward is high and the door to door collection system is in practice, daily solid waste generation in this ward is 22.08 cu. m. however, a systematic solid waste management system is an urgent need of the community. Solid waste generated during operation of office building will be collected in fixed place designated within the building and disposal will be made as per municipal solid waste management system.

Electricity and Telecommunication and Water Supply

Basic facility in the houses of KMC ward no 11 is shown in table below.

Table 6: Basic facility in the houses in KMC-11

Service	Percent (%)
Electricity	100
Drinking water	95
Telephone	75
Toilet	90

Source: KMC, 2005, Ward Profile

Road

The different categories of roads and their lengths in the Ward are shown on the table below:

Table 7: Total road length (in Km) in Ward No 11, Kathmandu

Type	Length (km.)	Condition (%)		
		Good	Fair	Poor
Black-topped	15.91	46	49	5
Gravel	6.07	6	67	27
Dirt	3.22	1	61	38
Brick-paved	1.96	27	68	5
Stone-paved	1.46	30	40	30

Source: KMC, 2005, Ward Profile

3.7.2 Biological Environment

Vegetation

As project site lies in the heart of city, there is no any forest in the periphery and the floral diversity is not significant in the area. No clearance of vegetation is required in the project site. However, different species of trees found around the project area are Pine, Dhupi, etc are also found around the project areas which do not fall in the endangered list of species.

Terrestrial fauna and birds

As the area is surrounded by settlements from all directions, fauna diversity is not significant in the area. The different animals recorded in and around the site are *Calotes* species (Garden lizard), *Rattus rattus* (House rat), *Mus musculus* (House mouse). Besides this, varieties of butterflies and insects are also found in the area. Different birds found in the area are *Streptopelia* species (Dove), *Columba livia* (Rock pigeon), *Passer domesticus* (House sparrow), *Corvus splendens* (crow) etc. Aquatic life is insignificant because of high pollution levels in the rivers.

3.7.3 Socio-economic and Cultural Environment

Population Distribution and Ethnicity: The total population of this ward is 17,765 among which male and female population were 9,589 (53.97%) and 8,176 (46.03%) respectively. Number of households in the ward was 4,416. The dominant ethnic group in the area is Newars which are followed by Brahmin, Chhetri etc. (Source: CBS 2011)

Settlement Pattern

Population in the ward is densely distributed. 90% buildings of this area are constructed with RCC and brick structure.

Occupation and Economic Status

The major professions of the people in the ward are: service, business, foreign employment etc.

Education

Literacy rate in the given ward is considered very high as compared to national average literacy rate.

Table 8: Education Institution in the ward

Level of educational institution	Government	Private	Total number
Pre-primary	-	4	4
Primary	1	8	9
Lower secondary	1		1
Secondary	2	7	9
10+2, Higher secondary	1	-	1
Campus	2	-	2

Culture & Religious Places

The majority of the ward's multi-ethnic inhabitants follow the Hindu faith. Most of the people belong to the Newar community, and the feeling of religious tolerance and mutual cooperation runs high. Many temples were built in the ward from the time of King Rana Bahadur Shah. There are important religious edifices on the bank of the Bagmati River that forms the ward's southern boundary. Among them, Kalmochan Ghat and Mahadev temple built by Tripura Sundari stand out. (*Source: KMC, 2005, Ward Profile*)

Chapter 4: Impacts of Implementation on Proposal on Environment

The impacts have been identified mainly for two stages i.e. project construction stage and post construction i.e. operational and maintenance stage on the existing physical, biological and socio-economic and cultural resources. Checklist was prepared for the prediction and evaluation of the identification of the impacts. A detail survey was also done to assure the impacts predicted. This study has distinguished beneficial and adverse impacts, direct and indirect impacts.

4.1 Adverse Impact (Construction Stage)

4.1.1 Impacts on Social, Economic and Cultural Environment

Arrival of workers during construction stage

The project will provide employment for about 120 skilled masons and another about 250 workers during the construction phase. The increases in site population will increase the pressure on the social infrastructures and restaurants. Due to influx of workers, conflict may also arise in the community. The magnitude of impact will be short term, local and insignificant.

Conflict between local and outside workers

Social conflict may arise during construction phase. Workers and the technician will be harmonized and reside in such a way that their works and activities do not affect in the local environment and communal harmony. The impacts will be the insignificant, short term in duration and site specific.

Occupational Health and Safety issue

Construction approach of the proposal is labor intensive. Labors involved in proposal construction activities are exposed to different kinds of occupational risks. Lack of awareness to the use of safety equipment could be the main causes of injuries. Similarly, transmissible diseases such as cholera, diarrhea and respiratory diseases are of high risk due to unhygienic food and heavy work as well as involvement in alcoholism. The impact will be moderate and can be mitigated through proper consultation.

Labor and wage issues

One of the major impacts that will arise is the managerial decision like wage and working time issues that may cause the controversy among the labor and also local people. The way how manager mobilizes their labor and from where the manager hire the labor may causes the conflict. This may cause delay in the construction work and strike too. The impacts will be moderate, short term in duration and site specific.

Nightlife disturbances

Almost all construction activities will be carried out in day time. Moreover, there is no significant night life in the vicinity because the area includes majority of financial institutions, colleges, educational institutions, offices and shops. Therefore, this impact is not significant in this area.

Health and sanitation issues

Health and sanitation facility is not in place in the construction site. This might help water and airborne diseases susceptible to workforce working in the site. This impact is of medium magnitude, local and short term in nature.

Social Security

Workers are expected to be brought in the construction site from other areas. This activity might increase the crime rate and illegal activities in the area. As the labor groups have a tendency to drink alcohol and engage in anti-social activities increasing crime rate and social conflict. This may have a serious long term impact for the people living nearby as the trend could be followed by the locals even after the completion of construction work. The impact is direct, of low magnitude, local and short-term in nature.

Access for Groundwater Committee Office;

The Groundwater Resource Development Committee office has the access through the project area. So the construction activities during the construction period may hamper the access for the Groundwater Resource Development committee office. In this context the Impacts may be local and short term with medium magnitude.

Pressure on public utilities

Increased number of people will over use limited resources so there may be shortage of public utilities for local people. All the workers tend to get their basic needs from the local area which has limited supply. Therefore, it may be difficult to sustain the workforce unless an alternative is properly found. This impact is of low magnitude, local and short term in nature.

Issue regarding the pedestrail and transport movement via adjacent road

The project area is located near to the road for Singhdurbar South Gate. So the construction activities may disturb the road and transportation activities.

Aesthetic Value

The aesthetic value of the construction place will not be appealing to eyes during construction stage. There will be pile of construction materials, unfinished construction works and pile of construction waste in the site which will lower aesthetic value of the site. The impacts shall be the insignificant, short term in duration and site specific.

4.1.2 Impacts on Physical Environment

Change in land use and landscape disturbances

The conversion of the barren land into built up area would not have significant impact on the land use. There is no possibility of soil erosion and landslide as well. The impacts to land use due to construction activities of the proposed project will not be significant.

Earthwork excavation and spoil disposal

Earthwork generates spoil that needs to be properly disposed off the site. This waste along with other construction waste needs to be properly managed. If not properly managed, the waste can cause water pollution, damage irrigation canals, destroy current vegetation and also increase soil erosion if not managed properly. The impacts to land use due to excavation and spoil disposal during the construction of the proposed project will not be significant.

Stockpiling of construction materials

Stockpiled construction materials may be washed away by rainwater causing ground water pollution and deposition of solid materials like soil and plastic sheets/metallic sheet etc to the nearby sewerage. There will be provision for their management and stopping them to move to those places hence the environmental impacts due to stockpiling of construction material shall be short term, local and insignificant.

Disturbances to surrounding due to increase in vehicular movement in the locality due to transportation

Vehicles such as Truck, mini-truck, will come to the Proposal site. The existing road is well conditioned and wide enough. The impacts due to transportation to access road are insignificant. Few heavy vehicles arrive during the construction phase after 8 pm hence no effect to the local traffic system and neighbour. Care and appropriate measures shall be taken not to affect the neighboring houses. This impact will not be significant.

Groundwater extraction

The ground water extraction is the only means to fulfill demand of water during construction phase. Continuous extraction of ground water will change the ground water table. The magnitude of impacts shall be low, local and insignificant.

Drainage system

During the construction period wastewater is generated by workers as well as constructing work. Activities like cleaning purpose and domestic purpose such as washing clothes, cooking, and bathing etc. produce wastewater. The impact will be insignificant, local and short term in nature.

Air and noise pollution

During the proposal construction phase vehicles and construction materials movement will release dust, smoke and particulate matters. The impacts from such effect are likely to degrade human health, particularly of the labor engaged in building construction and people living in the

vicinity. They may cause respiratory disease. Dust and smoke generation will be maintained under tolerable limits. All these effects will be temporary and will last till construction period only. The magnitude of the environmental impact shall be low, local, short term and insignificant.

Solid waste management including demolition waste

The debris generated during building construction and solid waste produced by the workers need to be disposed in appropriate locations. Inadequate spoil disposal may often cause unpleasant odor and disturbance in nearby settlement and roads. The impact will be generally being low in magnitude, short term and site specific in extent.

Vibration Impacts during Construction Works:

During the construction of the project Building especially during basement excavation period , vibration may cause. This vibration may cause the impacts to the other local neighbouring building and structures. The impacts may be local and short term within the period of construction stage.

Impact on cultural, religious and historic sites

This project will not have any impact on religious and historical sites.

4.1.3 Impacts on Chemical Environment

Change in water and soil quality by the use of oil, paints, etc.

There will be need of different types of chemicals like's paints and petroleum products. Improper management of these chemicals will affect the health of worker and surrounding area. The chemical impact will be low in magnitude, site specific in extent and short term in duration.

4.1.4 Impacts on Biological Environment

Loss of open space and vegetation

The baseline information reveals that there is no any sort of ecologically important species. Therefore there isn't any harm in the ecology of the area. Open space in the project site was used for parking and it will be compensated by underground parking in the building.

4.2 Adverse Impacts (Operation stage)

4.2.1 Socio-Economic and Cultural Impact

Social Security

There will be insignificant impact on social security. This impact will be minor, local and long term in nature.

Change in social value and conflict

The building will be used for official purpose and the impact on change in social value and conflict will be low, local and hence insignificant.

Health and Safety Impact

The proponent will arrange daily cleaning of the project premises and the healthy living environment shall be created inside the project periphery. The magnitude of the impact shall be moderate, the extent shall be local and the duration shall be long term.

Pressure on public utilities

There will be insignificant impact on pressure on public utilities. The magnitude shall be minor, local and short term.

4.2.2 Impacts on Physical Environment

Change in Water Table/ Water Quality

This building will be using deep boring to fulfill its water demand. This, in long term will decrease water table of this area. In addition to this, increased built-up area will reduce the percolation of water into the ground. The decrease in percolation shall cause in the fall of water table level. Greenery area must be maintained to reduce this problem. The impact will be moderate in magnitude, local in extent and long term in duration.

Water Demand and Supply

The whole building shall be supplied water from the deep tube well boring which will be only constructed after getting the permission through KUKL. It Filter plant shall also be installed. This will be sufficient for water demand of the building. The impact will be low in magnitude, local and long term in duration.

Pressure on public utilities (water supply, electricity, telephone etc.)

During operation phase, the building will require water, electricity and telephone facilities. Water demand will be fulfilled by underground resources therefore, it will not put any pressure on municipal drinking water supply chain. However, electricity and telephone connections will be connected from Nepal Electricity Authority (NEA) and local telecom companies. This will not impose any significant pressure on local supply chains. Therefore this impact is very low in magnitude, local and long term in duration.

Visual Disruption to existing landscape and obstruction of sunlight

At present, the area has some high rise buildings like 'Kathmandu District Court' to the south and NMB bank in the eastern side. Construction of this building will therefore have very low impact of existing landscape. The project site shall add beauty to the local area. Therefore this impact is low in magnitude, site specific and long term in duration.

Air and noise pollution including indoor air pollution

This building does not have any foreseen air pollution issues. However, during operation of generators and high capacity water pumps, sound pollution will be an issue. This impact is low in magnitude, local and long term in duration.

Fire hazard and other emergency response system

There is always higher risk of fire hazard and other emergencies. Kathmandu being very prone to earthquakes, will require efficient emergency response system. This impact is low in magnitude, local and long term in duration.

Uninterrupted and efficient power supply

This building will have 24 hours supply of power. The building will take electricity power from the NEA supply by installing a high capacity transformer to receive HT power and convert it into LT power, but will also be equipped with standby generator to be used during the intervals of power off for a long period. This impact will be low in magnitude, local and long term in duration.

Movement of vehicles and parking

This building will have regular traffic flow during office hour. This will create traffic congestion in the entrance and exit points to and from the building. As the sideway section road is already congested, this access point will add to congestion in the area. This impact will be of medium significance, local and long term in duration. Pressure is more on office time i.e. 10 am-5pm

Surface Runoff and Drainage systems

Lack of proper drainage of storm water shall cause pounding of water resulting vector diseases in the area. The rainwater could be managed by using domestically or by recharging ground water. Then excess water needs to drain out through the existing municipal drain. The impact will be moderate, local in extent and long term in duration.

Vibration Impacts

During the construction period there may be some physical activities which may cause create vibration. The vibration that may cause from the construction activities could create the impacts to the associated buildings and houses. The impacts will be short term, Low Magnitude and Specific in nature.

Solid Waste Management

The forms of solid wastes would be biodegradable and non-degradable which will be generated from the proposal implementation. The degradable solid waste may spread different types of diseases if allowed to decay at the open space for a long time.

The collected waste will be finally disposed in the Municipal waste disposal system only the waste which cannot be reused or recycled. The reusable and recyclable waste from the office

building shall be encouraged to sell to the local scrapers. The magnitude of the impact is moderate, extent is local and the extent is long term.

Hazardous Waste Management:

DHM is using the Mercury based Thermometers and barometers on its measurement of climatic parameters. So the collection of the hazardous waste may cause the impacts. The collection may be short term and the hazardous waste management guidelines within the DHM has already prepared.

4.2.3 Impacts on Chemical Environment

Change in water quality and soil quality by the use of oil, paints etc.

The proposal requires different types of chemicals like paints and petroleum products. Improper management of these chemicals will affect the health of employees working in the building and surrounding area. Also, during operation phase, wastewater will be generated. If it's not properly taken care of, that will degrade water quality of surrounding area. The chemical impact will be low in magnitude, site specific in extent and short term in duration.

4.2.4 Impacts on Biological Environment

There is no any impact on flora and fauna existing as listed in CITES nearby proposal location. However, greenery area developed will have varieties of flowers, grasses and trees. However the garden management will be done within the premise of the DHM with ornamental and ecologically important species.

Enhancement of approach road

This project will construct approach road to and from the main road to the building. This impact is of low magnitude, site specific and long term in duration.

Chapter 5: Alternatives for Implementation of Proposal

Alternative analysis is an integral part of the IEE report. The alternatives are examined in order to maximize the project benefit and minimize the adverse impact.

- No project option was analyzed as first alternatives.
- The team also compared and analyzed alternatives in terms of project location, site, design, time schedule, raw materials (resources) and technologies, working procedures alternative and environmental management system alternatives.

All these alternatives were evaluated and best and cost effective, environmental friendly option was recommended to implement.

5.1 No Implementation of proposed Project

The first alternative, i.e., do nothing alternative, prevents the implementation of the project and may limit better office environment for DHM. If the project is not implemented, the office will continue to work in the same old office building. Thus, it will affect the overall performance and efficiency of the office.

5.2 Design Alternative

The proposed proposal would be constructed in a highly facilitated area. The building will be constructed based on National Building Code. An earthquake resistance building will be the main concern and to provide as much facilities to the office users as possible.

5.3 Site Analysis

The proposed site is the suitable place for the construction of building. The proposed area is selected for the construction due to available land of DHM, better access to public facilities like transportation and other public facilities. There is no alternative site for this project.

5.4 Process, time-schedule alternative

Construction materials will be transported in morning and evening that will help to reduce the traffic jam at the project area. Transported materials will be covered up with poly sheet. During the time of construction the built up portion will be covered with net for trapping dust as well as noise and for the safety of the workers. The expected completion of the project is 36 months so as to minimize the impacts on the locality.

5.5 Resource alternative (raw materials to be used)

Major raw alternatives for construction process will be cement, brick, sand, aggregate, glass and mild steel rods. Use of forest product will be minimized.

Others

Alternative energy source, alternative drinking water supply will be analyzed.

Chapter 6: Alternatives to reduce or control the impact of implementation of proposal on Environment (Mitigation Measures)

Selection of Environmental mitigation measures/Environmental protection measures largely depends on the nature and type of environmental impacts evaluated. This will provide measures that augment the beneficial impacts, and avoid or mitigate or compensate the adverse impacts to improve the socio-economic condition of the people. It has the objectives of improving the condition of the environmental resources.

The following are the recommended mitigation measures to be adopted for construction and operation phase.

6.1 Adverse Impact (Construction Stage)

6.1.1 Impacts on Socio-Economic and Cultural Environment

Influx of workers from outside

- Workers will be hired according to the intensity of works and need of the work
- Temporary camp will be made for their stay

Conflict between local and outside workers

- Workers will not be allowed to be involved in alcoholism and gambling.

Occupational Health and Safety, health and sanitation

- Awareness to safe working procedure
- Use of safety equipment eg. helmet, gloves, boots, mask, earplugs, net, safety belt etc
- Awareness to contagious and communicable diseases
- First aid box will be in proper condition
- Workers will have insurance facility in case of on job injuries.

Labor and wage issue

- Equal opportunity to all workers and all workers will be equally treated.
- Workers wage will be pre-determined so that conflict does not arise during construction stage.
- Child labor will not be used during construction.

Nightlife disturbances

- No impact foreseen therefore no mitigation is suggested.

Health and sanitation issues

- Regular cleaning of the place will be done
- Unwanted water accumulation in the construction site will be avoided

- Proper drinking water and sanitation facility will be provided at site

Social security

- Less noisy works will be done during the day time.
- Works will be covered so as not to advance the pollutants of air and noise.
- Gambling, alcoholism, will be strictly prohibited inside the proposal area.
- Workers will not be allowed to leave the site without authorization in the dark hours.

Pressure on public utilities

- Construction activities will import raw materials from wholesalers preferably outside of the locality if it is to pressure local supply.
- Construction site will have temporary toilets and bathrooms and also separate drinking water facility inside the site.

Aesthetic values

- Raw materials required will be brought and bought at the time of its utility
- Construction site will be enclosed with opaque barriers.

6.1.2 Impacts on Physical Environment

Change in Land use and Landscape Disturbances

- Equipment will be handled properly
- Haphazard disposal will be strictly prohibited

Earthwork excavation and spoil disposal

- The residual construction materials will be reused for other construction purposes
- Proper store of grease, paints and other construction materials
- Reuse the solid waste.

Stockpiling of Construction Materials

The unnecessary piling of construction materials would disturb the scenic beauty and landscape of the local environment. For this, following mitigation measures will be carried out:

- Construction materials will be kept in appropriate place
- Haphazard disposal of construction materials will be strictly prohibited
- Construction materials will be arranged in a way for the betterment of aesthetic beauty
- The residual construction materials will be reused for other construction purposes
- Grease, paints and other construction materials will be stored properly

Disturbances to surrounding due to increase in vehicular movement in the locality due to transportation

- Movement of heavy vehicles will only be done during night time (after 8 PM and before 7 AM)
- Vehicles coming and going out of the project site will be assisted by guards to the main road.

Groundwater extraction

- Rainwater harvesting technology will be applied to reduce the ground water depletion
- Rechargeable pits will be constructed to recharge ground water

Drainage system

- Waste water will not be allowed to discharge in open area
- Waste water will be treated to the effluent standard before disposal
- Urination and defecation in open areas and water-bodies will be controlled
- The drain water will be treated before discharging into the sewerage system

Air and noise pollution

- Green sticker vehicles will be encouraged for construction material transportation.
- Maintenance of the exhaust emission equipment materials will be regularized for vehicles as well as equipment.
- Water will be sprinkled continuously to avoid dust emission from the stockpiling of bricks, aggregates.
- Poly sheets will be used to cover the materials (cement, soil, sand etc.) during transportation.
- Cement bags, soil, sand will be kept inside the temporary building and will be covered.
- Vehicles like dozers, mixer, vibrator and marble cutting machine will be operated only during day time as far as possible
- Construction activities will not be performed during nighttime as far as possible
- Old equipment will not be used
- Earplug will be provided to the worker involved in equipment operations

Solid waste management including demolition waste

- Haphazard disposal of construction materials will be strictly prohibited
- Waste Container will be kept inside the construction site for segregation of waste which will be given to door to door waste collection organization.

Impact on cultural, religious and historical sites

- Access road will be repaired if any damage is occurred by the project activity
- Transportation of construction material will be done at morning

Impacts due to the Vibration effect

- Large vibration producing machine shall not be used
- If the vibration cause any damages to the neighbouring building and structures the contractor shall be paid compensation

6.1.3 Impacts on Chemical Environment**Change in water quality and soil quality by the use of oil, paints, bitumen, etc**

- Wastewater will be properly channelized to the sewerage system.
- Leadless paint will be used as far as possible

6.1.4 Impacts on Biological Environment

Loss of open space and vegetation

- Plantation will be done around the building in the form of gardens.

6.2 Adverse Impacts (Operation stage)

6.2.1 Impacts on Socio-Economic and Cultural Environment

Social Security

- Building will be guarded by security guards 24 hours a day
- CCTV cameras will be installed in the lifts, entrance and corridors

Change in social values and conflict

- No mitigation measures recommended

Health and safety issues

- Safety evaluation will be properly done after finishing works is completed
- Organize health & hygienic program for the workers
- Offices will be advised to keep first aid kits
- Regular clean the business complex
- Hospital is within 10 minute's distance from the building therefore, any serious health problems can be treated in nearby hospitals.

Pressure on public utilities

- Canteen will be established inside the building
- Drinking water facilities will be available

6.2.2 Impacts on Physical Environment

Change in Water Table/ Water Quality

- Rainwater harvesting technology will be applied to reduce the ground water depletion
- Rechargeable pits will be constructed to recharge ground water
- Excessive water will not be extracted
- Permission will be taken from the Underground Water Development Board to install deep boring

Water Demand/ Supply

- Only required quantity of water will be extracted by deep boring
- Deep boring water will be treated to meet Nepal's Drinking Water Quality Standard

Pressure on public utilities (water supply, electricity, telephone, etc.)

- No significant impact detected therefore no mitigation measures is suggested.

Visual Disruption to Existing Landscape & Obstruction of Sunlight

- Proper setback is ensured in the design

Air and noise pollution including indoor air pollution

- Generators will have silencer installed and will be kept inside a separate room

Fire hazard and other emergency response system

- Smoke detection devices will be installed
- Electrification will be properly done and earthen will be done for the precaution measures.
- Fire extinguisher will be placed
- Emergency reservoir tank will be made
- Building will be made according to National Building Code, 2005

Uninterrupted and efficient power systems

- 24 hours electricity supply will be provided
- Generator backup in case of power cut

Movement of vehicles and parking

- Roadside & haphazard parking will not be allowed
- Traffic signs will be placed inside and around the area.
- Separate entrance and exit outlets for vehicles will be constructed

Surface Runoff and Drainage system

- Rainwater harvesting technology with recharge pits will be installed to recharge ground water

Waste water management

- The drain water will be treated before discharging into the sewerage system

Solid waste management

Both bio-degradable and non-bio-degradable will be segregated. 3R principle will be followed for the management of the solid waste.

- Waste segregation and disposal mechanism will be established by providing different colored dustbins marking degradable and non-degradable waste
- Recyclable solid waste will be sold
- Non-degradable waste will be recycled to some extent.
- Coordinate with KMC authority for final disposal of solid waste
- Keep required number of container inside the premises.

6.2.3 Impacts on Chemical Environment

Change in water quality and soil quality by the use of oil, paints, etc.

- Grease, and oils will be properly disposed
- Nothing is allowed to throw in the open spaces. Separate dustbin will be kept in the project site

6.2.4 Impacts on Biological Environment

- No adverse impact predicted

Chapter 7: Environmental Monitoring Plan

Environmental Monitoring Plan (EMP) is to formulate a Monitoring Plan for baseline impact and compliance monitoring. EMP helps to generate useful information and helps to improve the implementation of quality of mitigation measures. Monitoring is a continuous observation of proposed actions to examine what changes have taken place, what has gone wrong, and who is to improve them.

The main objective of environmental monitoring is to detect impact in the early phase of project activity in order to take corrective action before it starts. Other objective of monitoring is to provide feedback on the accuracy of impact prediction, effectiveness of mitigation measures and provide guidance for readjustments during project implementation and operation. Environmental monitoring thus helps to ensure the effectiveness of environmental mitigation measures, compliance with environmental standards.

During the monitoring works, the 5W approach should be adopted and it should answer the following questions

- What should be monitored?
- When monitoring should begin?
- Where it should occur?
- Which method should be employed?
- Who should take the responsibility for monitoring?

7.1 Types of Monitoring

Monitoring is a continuous observation of proposed actions to examine what changes have taken place, what has gone wrong and who is to improve them. Usually, monitoring takes place in three aspects:

7.1.1 Baseline Monitoring

It is conducted to know the pre-baseline condition of the environmental parameters. It is also called pre-audit study. It is a survey that documents detail information on the pre-project conditions of physical, biological, socio-economic and cultural resources. Baseline monitoring may not be required in case the project will be implemented immediately after the EA study. However, it is required if there is a significance time lapse between preparation of EA report and construction stage and there is a change in noticeable environmental change.

7.1.2 Compliance monitoring

This monitoring is carried out to know the implementation status of environmental requirements as documented in EA report and they should be complied with during pre-construction, construction, and operational stages of the project. It employs periodic sampling or continuous recording of certain parameters, and ensures implementation of any conditions set-forth during EA report approval. Compliance with conditions may differ to the proponent or other organizations and individuals. The proponent should ensure:

- Incorporation of EPMs in design and tender documents
- Allocation of adequate budget for EPMs implementation
- Rehabilitation of social service facilities etc.

7.1.3 Impact Monitoring

Environment assessments propose to implement EMPs as planned. After implementation and compliance with of EMPs, it is necessary to know their effectiveness. This monitoring detects environmental changes and estimate inherent variation within the environment establishes a long-term trend in a natural system and derives conclusions by making comparisons against a standard or target.

7.2 Monitoring Mechanism (Responsibility)

Environmental Monitoring Plan (EMP) has been prepared for construction and operation phase. The proponent will set out environmental management requirements to develop procedures that ensure all mitigation measures and monitoring requirements specified in this report. EMP will actually be carried out in proposal construction and subsequent stages of implementation and operation. The proposed monitoring responsibility is shown in the following table.

Table 9: Monitoring Mechanism

S.N	Roles and Responsibilities	Organization	Time Schedule
1	Monitoring of Proposal, construction and operation activities against approved IEE measures	MoUD/ Proponent	At least two times during Construction/operation phase
2	Assist ministry on monitoring activities. Ensure that all environmental measures to be adopted are fully adhered.	DUDBC/ KMC	During different phases of Proposal implementation and operation.
3	Ensure all environmental measures prescribed by approved IEE have been fully adopted.	DUDBC/ KMC	Before and during construction.
4	Ensure that all mitigation measures and cost required for mitigation and monitoring are incorporated in the final design	DUDBC/ MoUD	During final design and Before approval the Proposal

7.3 Estimated Budget for EMP Implementation

In accordance with Rule 13 of the EPR 1997 the concerned agency, MoUD in this case; is the legally responsible monitoring agency. Apart from the responsibility mentioned in the above table, MoUD can monitor any parameters. The rule 13 also empowers the ministry to issue additional environmental control measures and directives to the Proposal to adopt measures to reduce or control impacts if the actual impacts are higher than the ones specified in the conditions prescribed at the time of approving the proposal for implementation. The total estimated cost for the Environmental Monitoring is NRs 0.5 million.

7.4 Monitoring Parameters:

The parameters to be measured are given below in the table.

Table 10: Environmental Impacts, Concern Monitoring Agency and Responsible Authority with Remedial Cost.

Impacts	Magnitude	Duration	Extent	Nature	Mitigation Measure	mitigation cost	Monitoring Responsibility
<i>Impacts on Socio-Economic and cultural Environment</i>							
Construction							
Arrival of workers during construction stage	Moderate	Short term	local	Direct	<ul style="list-style-type: none"> Workers will be hired according to the intensity & need of work Temporary building will be made 	100,000	Proponent
Conflict between local and outside workers	Insignificant	Short term	Site specific	Direct	<ul style="list-style-type: none"> No discrimination on workers Labor Act, 1991 will be strictly followed 	--	Proponent
Occupational Health and Safety issue	Moderate	Short term	Site specific	Direct	<ul style="list-style-type: none"> Awareness to safe work procedure Use of safety equipments as helmet, gloves, boots, mask, earplugs net safety belt etc Awareness to communicable diseases Keep First aid box Temporary toilet and bathroom will be made No one outsider will be allowed to enter the construction zone 	200,000	Proponent
Labor and wage issues	Moderate	Short term	Site specific	Direct	<ul style="list-style-type: none"> Equal opportunity to all workers and all workers will be equally treated. Workers wage will be pre-determined so that conflict does not arise during construction stage. Children will not be used during construction. 	---	Contractor
Health and sanitation issues	Moderate	Short term	Site specific	Direct	<ul style="list-style-type: none"> Regular cleaning of the place will be done Unwanted water accumulation in the construction site will be avoided 	----	Contractor/Proponent

					– Proper drinking water and sanitation facility will be provided at site		
Social security	Moderate	Short term	Site specific	Direct	– Works will be done during day time – Dust producing Works will be covered – Gambling, alcoholism, will be controlled	10,000	Proponent/ KMC
Labor and wage issues	Moderate	Short term	Site specific	Direct	– Local workers will be hired as their knowledge – All workers will be equally treated	--	Proponent
Pressure on public utilities	Low	Short term	Local	Direct	– Construction activities will import raw materials from wholesalers preferably outside of the locality if it is to pressure local supply. – Construction site will have temporary toilets and bathrooms and also separate drinking water facility inside the site.	--	Contractor/ DUDBC
Aesthetic values	Insignificant	Short term	Local	Direct	– Raw materials required will be brought and bought at the time of its utility	--	Proponent/ DUDBC
Operation & maintenance Stage							
Social and cultural values and rituals	Insignificant	Long term	Local	Direct			Proponent
Social Security	Insignificant	Short term	Site specific	Direct	– Building will be guarded by security guards 24 hours a day – CCTV cameras will be installed in the lifts, entrance and corridors	BOQ	Proponent
Change in social value and conflict	Low	Long term	Site specific	Direct	– Business community will be encouraged to form which will harmonize and respect in terms of their culture, religion, sex and caste. – Occupants will be gathered and meetings will be organized to socialize for facilitating harmony among them	--	BHC
Health and safety impact	Moderate	Long term	Local	Direct	– Safety evaluation will be properly done after finishing works is completed	--	Proponent/B HC

					<ul style="list-style-type: none"> – Organize health & hygienic program – Offices will be advised to keep first aid kits 		
Pressure on public utilities	Low	Long term	Local	Indirect	<ul style="list-style-type: none"> – Restaurants will be established inside the building – Drinking water facilities will be available 	--	Proponent
Impacts on Physical Environment							
Construction Phase							
Change in land use and landscape disturbances	Low	Short term	Site Specific	Direct	<ul style="list-style-type: none"> – Equipments shall be handled properly – Haphazard disposal will be strictly prohibited 	BOQ	Proponent /DUDBC
Earthwork excavation and spoil disposal	Low	Short term	Local	Indirect	<ul style="list-style-type: none"> – Debris and earthwork generated will be collected, segregated and reused. 	--	Proponent/ /DUDBC/K MC
Stockpiling of construction materials	Insignificant	Short term	Low	Direct	<ul style="list-style-type: none"> – Haphazard disposal will be controlled – Construction materials, grease, paints will be properly arranged – Residual construction materials will be reused for other purpose 	BOQ	Proponent/D UDBC/ MoUD
Increase in vehicle movement in the locality due to transportation	Insignificant	Long term	Local	Direct	<ul style="list-style-type: none"> – Any damage to the access road will be repaired – transportation of construction material will be done at night or early morning 	300,000	Proponent/D UDBC
Groundwater extraction	Low	Short term	Site Specific	Direct	<ul style="list-style-type: none"> – Rainwater harvesting technology will be applied – Rechargeable pits will be constructed 	75,000	Proponent/ MoUD /DUDBC
Drainage system	Insignificant	Short term	Local	Direct	<ul style="list-style-type: none"> – Waste water will be collected and treated – Urination and defecation in open areas and water-bodies will be controlled – Temporary toilets will be constructed 	100,000	Proponent/ MoUD /DUDBC

Air and noise pollution	Low	Short term	Site specific	Direct	<ul style="list-style-type: none"> – Green sticker vehicles will be hired – Maintenance of old equipment. – Water will be sprinkled continuously – Poly sheets will be used to cover the material – Cement, soil, sand will be covered by poly sheet – Vehicles like dozers, mixer, vibrator and marble cutting machine will be operated only at day time – Construction activities will be done at day time – Old equipment will not be used – Earplug will be provided to the worker involved in equipment operations 	20,000	Proponent/ MoUD
Solid waste management including demolition waste	Low	Long term	Local	Direct	<ul style="list-style-type: none"> – Debris will be reused – Container will be kept inside the construction site to collect the waste 	35,000	Proponent /DUDBC/K MC
Operation & maintenance phase							
Change in Water Table/ Water Quality	Moderate	Long term	Local	Direct	<ul style="list-style-type: none"> – Rainwater harvesting technology will be – Rechargeable pits will be constructed to recharge ground water 	BOQ	Proponent/M oUD /DUDBC
Water Demand / Supply & Waste water Disposal	Low	Long term	Local	Direct	<ul style="list-style-type: none"> – Treated Water will be of Nepal's National standard – Only insufficient water will be extracted 	BOQ	Proponent/M oUD/DUDB C/KMC
Visual disruption to existing landscape and obstruction of sunlight	Moderate	Long term	Local	Direct	<ul style="list-style-type: none"> – Proper setbacks as per National Building Code will be maintained 	--	Proponent /DUDBC

Air and noise pollution including indoor air pollution	Low	Long term	Local	Direct	– Air purification systems will be installed on generators.	BoQ	Proponent
Fire hazard and other emergency response system	Low	Long term	Local	Direct	– Smoke detection devices will be installed – Earthen and Electrification will be properly done – Fire extinguisher will be installed – Emergency reservoir tank will be made – National Building Code, 2005 will be followed	BoQ	Proponent /DUDBC
Uninterrupted and efficient power supply	Low	Short time	Site specific	Direct	– 24 hours electricity supply through backup generators.	BOQ	Proponent /DUDBC
Movement of vehicles and parking	Moderate	Long term	Site specific	Direct	– Haphazard parking will not be allowed – Traffic signs will be placed – Speed limit of vehicle inside business complex will be maintained	50,000	Proponent/MoUD /DUDBC/traffic police
Surface runoff and drainage systems	Moderate	Long term	Local	Direct	– Rechargeable pits will be installed – Greenery area will be maintained	BOQ	Proponent/MoUD /DUDBC
Solid waste management	Moderate	Long term	Local	Direct	– Waste segregation, reused and disposal by different colored dustbins – Awareness raising programs on waste management – Coordinate with KMC authority	50,000	Proponent/MoUD /DUDBC/KMC
Impacts on Chemical Environment (all phases)							
Change in water quality and	Moderate	Long term	Local	Indirect	– Leadless paints will be used – Quality assurance and quality control	BOQ	MoUD /DUDBC
Impacts on Biological Environment (All phases)							
Loss of open	Moderate	Long	Site	Direct	– No wildlife present	DC	Proponent

space and vegetation		term	specific		– Development of greenery area		
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The duration, magnitude and extent of the potential impacts are given based on the consultation with design experts and experts' judgment.

7.5 Cost of Environmental Mitigation Measures

The design and cost estimate for most of the suggested mitigation measures is given table above. The total estimated cost of mitigation measures is NRs 940,000. Other costs will be included in engineering cost of the project.

Chapter 8: Review of Acts, Policies, Regulations and Guidelines

During the course of this study, relevant Acts, Regulations, Policies and Guidelines have been thoroughly reviewed in order to understand the provisions made to integrate building construction and environmental conservation. This study is made on the basis of these Acts, Rules, regulation and Guidelines. The main documents that are also relevant to this project are presented here:

8.1 Constitution

Constitution of Nepal, 2015

Interim Constitution of Nepal mandates Environmental Protection as state policy. The article 35 clause 4 states, "The State shall, while mobilizing the natural resources and heritage of the country that might be useful and beneficial to the interest of the nation, pursue a policy of giving priority to the local people". The Clause (5) states, "The state shall make necessary arrangements to maintain clean environment. The State shall give priority to the protection of the environment, and also to the prevention to its further damage due to physical development activities by increasing the awareness of the general public about environmental cleanliness, and the State shall also make arrangements for the special protection of the environment and the rare wildlife. Provision shall be made for the protection of the forest, vegetation and biodiversity, its sustainable use and for equitable distribution of the benefit derived from it" (Interim Constitution of Nepal, 2063).

8.2 Acts

Environmental Protection Act, 1997

The Act obliges the proponent to prepare an IEE or EIA report in relation to prescribed plans, programs or projects which may cause in the existing environmental conditions from physical activity, development activity or change in land use. The section 3 of the EPA, 1997 makes mandatory for carrying out an IEE or EIA for the prescribed proposals in Schedule 1 and 2. The section 4 of EPA restricts implementing of the proposal without approving Environmental Impact Assessment for the prescribed Proposal in schedule -2. The legislation empowers the "concerned agency and the Ministry of to approve i.e. MoUD in this case.

Environmental Protection Rule, 1997 (With Amendment)

In the process of implementing EPA (1997) effectively, Environmental Protection Rule (ERP) has been enforced in 1997 and amended in 1999. EPR contains the elaborate provisions on the process to be followed during the preparation and approval of projects requiring EIA and IEE including scoping document, terms of reference, public consultation and hearing, and environmental monitoring and auditing. The TOR should be approved from concerned agency. EPR calls for the public consultation prior to the approval of IEE Report. The EPR, 1997, Schedule 1 and 2 contains a list of proposals, which require either IEE or EIA. Rule, 4 of the EPR 1997 (amendment 1999) empowers the MOEST to scrutinize and/or to approve the Scoping Reports of all "prescribed" proposals, which require an EIA study. EPR, 1997 obliges the proponent to publish a 15-day public notice in national daily Newspaper to let the VDC or Municipality; where the proposal is to be implemented, such as the schools, hospitals, health posts and concerned institutions of the area to know about the proposal and to offer, in writing, their opinions and suggestions with regard to environmental

impacts.

Local self-governance Act, 1999

The Local Self-Governance Act, 1999 empowers the local bodies for the conservation of soil, forest and other natural resources and implements environmental conservation activities. Sections 28 and 43 of the Act Provides the Village Development Committee a legal mandate to formulate and implement programs related to the protection of the environment and biodiversity. Similarly, sections 189 and 201 of the Act provides that the District Development Committees are liable to formulate and implement the programs related to protection of these environment and give adequate priority to the protection of the environment during the formulation and implementation of the district level plan(s).

Solid Waste Management and Resource Mobilization Act, 2011

This Act was exclusively formulated for the management of solid waste. The section 4.1 to 4.9 of Act and rule 2.1 to 2.10 is concerned with the management and control of the solid waste. The act instituted the Solid Waste Management and Resource Mobilization Center (SWMRMC) with the authority and responsibility to manage all aspects of solid waste including categorization of hazardous waste and collection, treatment, and disposal of solid wastes in the Kathmandu valley and other municipalities as well. This pioneering act was a positive step towards fulfilling the need of legal basis and regulation for solid waste management. The Local Self Governance Act (1999) also empowers the local bodies to manage their solid wastes independently.

Labour Act, 1991

It emphasizes on occupational health and safety of workers thereby providing necessary safety wares and adopting necessary precautionary measures against potentially hazardous machines/equipments. It stipulates to make arrangements such as removal of waste accumulated during production process and prevention of dust, fume, vapor and other waste materials, which adversely affect the health of workers.

Child labour (prohibition and regularization) Act, 2001

The section 3 of the act prohibit Child not to be engaged in Work, sub section 1 of the section 3 states " Nobody shall engage in work a child who has not completed fourteen years of age as a laborer and sub section 2 states "Nobody shall engage a child in a risk full occupation or work set forth in the Schedule. The section 4 states "Child not to be engaged in work against his will. The schedule describes different works conditions such as Risk full Occupation Works Tourism related occupation, Service oriented occupation, Public transportation and construction occupation & Work relating to manufacturing.

Town Development Act, 1988 (2045)

Section 5 (Kha) authorizes Town Development Committees to keep clean and aesthetic beauty of town.

Electricity Act and Regulation, 1993

Section 24 of the electricity act 1993 states "While carrying out electricity generation, transmission or distribution, it shall be carried out in such a manner that no substantial adverse effect be made on environment by way of soil erosion, flood, landslide, air pollution etc.

Water Resources Act 1992

Water Resources Act 1992 of section 3, 7, and 20 implies state ownership of any surface/ground water bodies of Nepal and stress on utilization of water resources by any individual or organization without causing harm to others. It has prioritized use of water resources in successive order keeping in first for drinking purpose. It urges that utilization of resource should be carried out without causing any considerable damage to the environment.

Water Supply Rules 1998

Rule 27 states that service providers of water supply should not build any structures causing Environmental adverse impact.

Water Supply Management Board Act 2005

As per Sub- section 8 (ga) of section 7 Kathmandu Valley Water Supply Management Board is an authority to issue license for the use of underground water or to regulate, control and prohibit the use of underground water.

8.2 Guidelines

National EIA Guidelines, 1993

Prior to the enactment of the environmental legislation, the Government implements the National EIA Guidelines, 1993 in order to integrate environmental aspects in the development proposals by conducting IEE or EIA. This guideline outlines the lists of projects, thresholds and sensitive areas. This guideline contains objectives, methods for screening of the Proposals and methods for ensuring public participation during the preparation of the EIA report. The guidelines stress the inclusion of monitoring and evaluation of a framework for environmental monitoring in the EIA report. The guideline has also set the provisions for identifying socio-economic, biological and physico-chemical and cultural impacts and prescriptions of mitigation measures to avoid, eliminate and/or minimize the adverse effects and to augment the beneficial impacts resulting from the project implementation.

8.3 Norms and standards

Planning Norms and Standards 2013

Formulation of Planning Norms and Standard has become necessary to manage an urban environment, improve an economic efficiency and the quality of life of urban area. It is for this reason that the Department has undertaken this initiative. For the sake of this Planning Norms and Standards, the term "Norms" has been defined as the socially or institutionally set values which does shape and govern the behavior pattern including physical and social relations in a given space, while the term "Standards" has been defined as level and quality of infrastructure services that would be required to make the built environment functional and desirable. The main objective of this planning norms and standards are:

- To facilitate urban designers, planners and policy makers to identify and forecast essential infrastructure need of an urban areas as well as help prepare urban plans and programs.
- To enrich understanding of urban form and land use and ensure balance between them.
- To guide the development and management of physical, social and economic infrastructure• services in a planned manner.

Kathmandu Valley Building Standards, 2007

The Building Bylaws authorizes the local government for the conservation of natural resources, management & monitoring of the construction activities inside KatmanduValley.

National Building Code, 2005

The national Building Code of Nepal was endorsed after cabinet decision which deals primarily with matters relating to the strength of buildings, site considerations safety during construction and fire hazards, construction materials etc. The code believes in sincere code of ethics of the personnel involved in designing to implementation phase of construction activities so as to achieve a meaningful improvement in construction in Nepal.

National Urban Development Strategy, 2015

The objective of National Urban Development Strategy (NUDS) is to develop medium and long term strategic vision of a desirable national/regional urban system based on existing trends and regional resource potentialities. It assesses existing conditions of infrastructure, environment, economy and governance, establishes benchmarks and desirable standards and identifies prioritized strategic initiatives for investment in infrastructure and environment to realize the comparative advantages of urban areas. It also reviews the institutional framework to facilitate implementation and monitoring of National Urban Policy (2007) and proposed urban development strategies. The implementation of NUDS is also expected to complement Nepal's effort to graduate from Least Developed Country (LDC) to Developing Country (DC).

Chapter 9: Conclusion and Recommendation

The IEE proposal has been proposed by Department of Hydrology and Meteorology. As per the requirement set out by EPR 1997, the study has been conducted as per the approved ToR from MoUD. The IEE has assessed potential environmental impacts due to the building construction and operation. Different elements of physical environment, geology and soil, hydrology, land use pattern air and noise, water sources, waste disposal were studied. No significant impacts were seen on these elements of the physical environment. This building construction does not pose negative impact to the hydrological system, water source, soil pollution, soil erosion and disturbances to the existing natural landscape. The study has not observed long term negative impacts; however, small impacts that are identified can easily be minimized and coped with proposed mitigation measures.

Different elements of the biological environment, vegetation and fauna have been studied. Adverse impacts on socio-economic environment are also found to be minimal. Different elements, demography, population growth and its composition, economic characteristic of population, migration pattern, agriculture and food situation, religion and culture and historical important area, of socio-economic and cultural environment have been studied. There would be short term employment opportunity and local economic activities would also increase at the time of construction as well as in operation phase. There is no any adverse impact to the socio-economic environment since there is no any land acquisition, people's displacement and rehabilitation due to the building. Numbers of mitigation measures construction safety, solid waste management at the time of construction and operation etc are outlined in previous chapters. In order to ensure the implementation of the environmental protection measures, an Environmental Management Plan (EMP) has been prepared, which include plan for the implementation of the mitigation measures. The plan includes detail on environmental monitoring, both compliance and impact monitoring.

There is no any significant adverse impact to the existing environment by the project implementation. Some impacts that are caused during construction phase will be checked after the completion and can even minimized during the process. As per the guidelines of the EPR, 1997 the IEE Study is sufficient and there is no need for any further studies. Hence the study recommends for implementing the construction of building.