Environmental Impact Assessment (EIA) of Manipal College of Medical Sciences Phulbari, Pokhara Metropolitan-11

Submitted to: Ministry of Forests and Environment through Ministry of Education, Science and Technology

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# TABLE OF CONTENT

**EXECUTIVE SUMMARY (NEPALI)** iii  
**EXECUTIVE SUMMARY (ENGLISH)** ix  

**CHAPTER 1: INTRODUCTION** 7  
1.1 PROPOINENT AND THE ORGANIZATION RESPONSIBLE FOR PREPARATION OF EIA STUDY 7  
1.2 Organization Responsible for the Preparation of the EIA Report 7  
1.3 PROJECT BACKGROUND 8  
1.4 RATIONALE OF THE EIA STUDY 10  
1.5 OBJECTIVES OF EIA STUDY 10  
1.6 STUDY METHODOLOGY 11  

**CHAPTER 2: PROJECT DESCRIPTION** 14  
2.1 PROJECT LOCATION 14  
2.2 OBJECTIVE OF THE PROposal 16  
2.3 SALIENT FEATURES OF THE PROJECT 16  
2.4 Human Resources 32  

**CHAPTER 3: EXISTING ENVIRONMENTAL CONDITION** 34  
3.1 PHYSICAL ENVIRONMENT 34  
Table 12: Analysis of water samples from four points of Seti River at Pokhara 35  
3.2 BIOLOGICAL ENVIRONMENT 37  

**CHAPTER 4: EXISITING ENVIRONMENTAL MANAGEMENT SYSTEM AT HOSPITAL** 43  
4.1 Waste management 43  
4.2 Infection Control Program: 46  
4.3 Occupational Health Safety Measures 47  
4.4 Proper Storage of Chemicals 47  
4.5 Fire Safety 48  
4.6 Water Supply 48  
4.7 Drainage and sewerage System 48  
4.8 Maintenance section 49  
4.9 local employment 50  
4.10 COMMUNITY DEVELOPMENT ACTIVITIES 51
List of Tables
Table 1: Salient features of the project 16
Table 2: Total Land Area 19
Table 3: Floor Area of Main Building (Hospital) 19
Table 4: Other Buildings and Department 20
Table 5: Gratuates of MCOMS till date from different course 21
Table 6: Students intake in MCOMS in different course 22
Table 7: Water Consumption per day 24
Table 8: Quantity and types of health care waste generated 27
Table 9: Human Resource in the hospital 32
Table 10: Land Use Types in Pokhara metropolitan City 34
Table 11: Air Quality Data of Pokhara City 35
Table 12: Analysis of water samples from four points of Seti River at Pokhara 35
Table 13: Demographic Profile of affected Ward 38
Table 14: Population by Ethnicity of Pokhara Metropolitan 39
Table 15: Household by main source of drinking water 40
Table 16: Household by type of Toilet 40
Table 17: Major Health Institutions Located in Pokhara Metropolitan 41
Table 18: Human Resource in Maintenance section 50
Table 19: List of staffs working in waste management 50
Table 20: Summary of Impact Identification, Prediction and Evaluation 60
Table 21 Gap analysis for mitigation measures 64
Table 22: Benefit Augmentation Measures for Beneficial Impacts 66
Table 23: Mitigation Measures for Adverse Impacts 67
Table 24: Estimated Cost for Mitigation Measures 72
Table 25 Environmental Management Plan for Benefit Augmentation Measures 86
Table 26 Environmental Management Plan for Adverse impacts Mitigation Measures 87
Table 27 Compliance Monitoring Plan 94
Table 28 Impact Monitoring Plan 96
Table 29 Compliance of hospital with Nepal Government Health Standards 96
Table 30 Environmental Monitoring Cost 100
Table 31 Environment Auditing Plan 101
Table 32 Collection of suggestion/opinion of Public hearing 104

List of Figures
Figure 1: Location of MCoMS in Google Image 14
Figure 2: Hostel Canteen 23
Figure 3: Canteen Facility in the hospital 24
Figure 4: Water Purification by Euro Guard installed 25
Figure 5: Existing waste water management at MCOMS 26
Figure 6: Different color indicated buckets 26
Figure 7: Existing waste management at MCOMS 28
Figure 8: Washing Machine & Dryer (50 Kg capacity) in Laundry unit 29
Figure 9: Fire Hydrant in case of emergency 29
Figure 10: generator, 600 & 320 KVA
Figure 11: Interaction with Dr. P.K Tiwari in Radiology Department
Figure 12: CT SCAN Machine
Figure 13: Parking facilities
Figure 14: Vegetation within the hospital compound
Figure 15: Settlement near the hospital
Figure 17: Autoclave at Waste Management Centre
Figure 16 Health Care Waste Management Centre
Figure 18: X-rays Sheets used by laser technology
Figure 19: Process flow diagram for ETP plant
Figure 20: Public hearing conducted at MCoMS

ANNEXES

ANNEX A: Company Related Documents (Company Registration, Pan Certificate, Necessary Permit From Ministry Of Health)
ANNEX B: Approved Terms And Reference (TOR) From MOFE
ANNEX C: Recommendation Letters
ANNEX D: Questionnaire Survey And Checklist
ANNEX E: List of Persons Consulted During EIA Study
ANNEX F: Attendance and Minutes of Public Hearing
ANNEX G: Health Care Waste Management
ANNEX H: Water Quality Test Report
ANNEX I: List Of Photographs
ANNEX J: Declaration form of EIA Study Team
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3R</td>
<td>3 (Reduce, Reuse and Recycle)</td>
</tr>
<tr>
<td>AC</td>
<td>Air-Conditioning</td>
</tr>
<tr>
<td>AIDS</td>
<td>Acquired Immuno-Deficiency Syndrom</td>
</tr>
<tr>
<td>ARI</td>
<td>Acute Respiratory Infection</td>
</tr>
<tr>
<td>BCN</td>
<td>Bird Conservation Nepal</td>
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<tr>
<td>BDS</td>
<td>Bachelor of Dentistry and Surgery</td>
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<tr>
<td>BN</td>
<td>Bachelor of Nursing</td>
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<tr>
<td>BOD</td>
<td>Biochemical Oxygen Demand</td>
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<td>BSc</td>
<td>Bachelor in Science</td>
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<tr>
<td>CBO</td>
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<td>Child Care Unit</td>
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<td>CGI</td>
<td>Corrugated Galvanized Iron</td>
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<td>CMA</td>
<td>Community Medical Auxiliaries</td>
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<td>COD</td>
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<td>CR</td>
<td>Computed Radiography</td>
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<td>Computed Tomography</td>
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<tr>
<td>cu m</td>
<td>Cubic Meter</td>
</tr>
<tr>
<td>DCC</td>
<td>District Coordination Committee</td>
</tr>
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<td>DHM</td>
<td>Department of Hydrology Metrology</td>
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<td>DIZ</td>
<td>Direct Impact Zone</td>
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<td>EA</td>
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<tr>
<td>FGD</td>
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<td>GCP</td>
<td>Good Clinical Practices</td>
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<td>Government of Nepal</td>
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<td>HACCP</td>
<td>Hazard Analysis and Critical Control Points</td>
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<td>Health Care Waste Management</td>
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<td>HD</td>
<td>Hemodialysis</td>
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<td>Household</td>
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<td>IEE</td>
<td>Initial Environmental Examination</td>
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<td>LPG</td>
<td>Liquefied Petroleum Gases</td>
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<td>LT</td>
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<td>Bachelor of Medicine and Bachelor of Surgery</td>
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<tr>
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<tr>
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<td>Ministry of Forest and Environment</td>
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<tr>
<td>MRI</td>
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<td>MS</td>
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<td>NGO</td>
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<td>NHSIP</td>
<td>National Health Sector Implementation Plan</td>
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<td>Primary Health Center</td>
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<td>Pediatric Intensive Care Unit</td>
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<td>POPs</td>
<td>Persistent Organic Pollutants</td>
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<td>R.O</td>
<td>Reverse Osmosis</td>
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<tr>
<td>RCC</td>
<td>Reinforced Cement Concrete</td>
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<td>SAARC</td>
<td>South Asian Association for Regional Association</td>
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<td>SEA</td>
<td>Strategic Environmental Assessment</td>
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<td>SICU</td>
<td>Surgical Intensive Care Unit</td>
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<td>SLTHP</td>
<td>Second Long Term Health Plan</td>
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<td>SPM</td>
<td>Suspended Particulate Matter</td>
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<td>ST</td>
<td>Short Term</td>
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<td>Sewage Treatment Plant</td>
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<td>SWCA</td>
<td>Soil and Water Conservation Act</td>
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<td>Solid Waste Management and Resource Mobilization Centre</td>
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<td>UNDP</td>
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<td>United Nations Educational, Scientific and Cultural Organization</td>
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<td>UPS</td>
<td>Uninterruptible Power Supply</td>
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<td>Village Development Committee</td>
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<td>WHO</td>
<td>World Health Organization</td>
</tr>
<tr>
<td>WSMC</td>
<td>Waste and Security Management Committee</td>
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</table>
मणिपाल चिकित्सा विज्ञान कलेज, पोखराको वातावरणीय प्रभाव मूल्यांकन

प्रतिवेदनको कार्यकारी सारांश

१. पृष्ठभूमि
नेपालमा उपलब्ध स्वास्थ्य सेवा तथा त्वरस्विंग समबङ्धित गुणस्तरीय पूर्वाधार विकसित मुलुकको तृतीया कम रहेको छ | विभिन्नको केही दशक देखि नेपाल सरकारले स्वास्थ्य सेवालाई प्राथमिकतामा राखेको छ र देखि विभिन्न क्षेत्रमा मेडिकल कलेज लगायत स्वास्थ्य क्षेत्रलाई आवश्यक पनि अन्य गुणस्तरीय दर्शक जनशक्ति उत्पादन गर्न शिक्षण संस्थाहरूको स्थापना गरेको जाने नीति लिएको छ | हुनत स्वास्थ्य सेवा उपलब्ध गराउने प्रमुख दायित्व सरकारको हो, तर सरकारको मात्र स्वास्थ्य क्षेत्रको माथि छोटो अवधिमा पुरा गरन कठिन भएको छ | यस मेडिकल कलेज तथा स्वास्थ्य समबङ्धित अन्य शिक्षण संस्थाहरूको स्थापनामा निजी संस्थाहरूले पनि सहभागिता बढेको छ |

मणिपाल चिकित्सा विज्ञान कलेजको स्थापना वि.स.१९९४ सालमा भएको हो | यस संस्थाको लक्ष्य चिकित्सा र स्वास्थ्य विज्ञानमा गुणस्तरीय शिक्षा प्रदान गरी, दर्शक जनशक्ति उत्पादन गर्न र नेपाल तथा विश्वव्यापी समाजमा गुणस्तरीय स्वास्थ्य सेवाको विकासको प्रवर्धन गरी अंतरराष्ट्रिय स्तरमा प्रतिष्ठित संस्था बन्ने लक्ष्य रहेको छ |

त्यसै अनुरूप मणिपाल चिकित्सा विज्ञान कलेजले स्थानीय स्तरमा दर्शक तथा तालिमप्राप्त चिकित्सक र स्वास्थ्य समबङ्धित अन्य जनशक्ति उत्पादन गर्नुको सारी पोखरा उपत्यका भित्र र बाहिर समेतका बासिन्दालाई गुणस्तरीय स्वास्थ्य सेवा प्रदान गर्न सीघ र अवधारणा अनुरूप संयंत्र भएको छ।

२. प्रस्तावक
यस योजनाको प्रस्तावक मणिपाल चिकित्सा विज्ञान कलेज रहेको छ, जसको ठेगाना यस प्रकार रहेको छ |

संस्था : मणिपाल चिकित्सा विज्ञान कलेज
ठेगाना : फुलबारी, पोखरा महानगरपालिका-१९, कास्की, नेपाल
संपर्क व्यक्ति : भानुप्रताप भारद्वाज (प्रशासन/मान्य संसाधन प्रमुख)
संपर्क न : +९७७-६१-५२६४१६/५२६४२०
फ्याक्स : +९७७-६१-५२७८६२
इमेल : MCoMS@manipal.edu.np
Website : www.manipal.edu.np

३. प्रस्तावको विवरण
वि.स.१९९४ सालमा स्थापित मणिपाल चिकित्सा विज्ञान कलेजको मुख्य लक्ष्य स्वास्थ्य क्षेत्रमा दर्शक जनशक्ति उत्पादन गर्नुको सारी शिक्षण अस्पताल मार्फत स्वास्थ्य सेवा प्रदान गर्न रहेको छ | यस
कलेजमा स्वास्थ्य विज्ञानको विभिन्न विषयमा स्नातक, स्नातकोत्तर तहको अध्ययन गराइन्छ | यस कलेज अन्तर्गतको शिक्षण अस्पतालसँग विभिन्न विभागबाट अन्तर्गत तथा बहिरंग गरी ६५० शैच्या माफिन बिरामीहरूलाई सेवा प्रदान गर्दै आएको छ | शिक्षण अस्पतालमा अन्तर्गत र बहिरंग विभागहरू तथा छुट्टे निजीको विभागहरू पनि छन्, जसमा १०० सिट्ट MBBS, ४० प्रविधिता नसिंड र ४० सिट्ट स्नातक नसिंका विद्यार्थीहरूका लागि अध्ययन गराइन्छ | यसै गरी आवास व्यवस्थाको लागि पर्याप्त व्यवस्था रहेको छ | 

4. विद्युमान वातावरणीय अवस्था

क. भौतिक वातावरण

यस कलेज काफी जित्लाको पोखरा महानगरपालिका, वडा नं ११ र १६ मा पर्दछ र यसले जलवायु समस्तैत्त्य विषयमा किसिमको छ र धेरै वर्षी हुने गर्दछ। कलेज कोठा डाँडाको पैदी निजीको समय र भौगोलिक रूपमा स्थित रहेको स्थानमा अवस्थित छ । यहाँ वर्षरो वायु र धनिको गुणस्तर सन्तोषजनक र देखि छ। यस कलेजको निजी सेती नदी बनेको छ। 

ख. जैविक वातावरण

यस कलेज जैविक वा वातावरणीय उडिेकोणले संवेदनशील क्षेत्र जसले: राष्ट्रिय निकुञ्ज, बन्युवनु आरक्ष वा अन्य कृषि किसिमको संसर्ग क्षेत्र मित्र पर्दछ | यस कलेजको उत्तरी सीमा बाहिर सामुदायिक वन रहेको छ । कलेज हाताहित्रु पूक्त पनि सेक्टरपन्न वा दुमेक प्रजातिका वनस्पतिहरू पाइएकैन।

ग. सामाजिक, आर्थिक र सांस्कृतिक वातावरण

यस कलेजको शिक्षण अस्पतल रहेको फुलबारी, पोखरा महानगरपालिका, वडा नं ११ र अर्थव्यवस्था अध्यात्मज्ञात्मक प्राज्ञ िा गतिविधि हुने दीप, पोखरा महानगरपालिका, वडा नं १६ को जनसंख्या, २०६५ सालको जनगणना अनुसार १३,६६६ (७,७६६ महिला र ७१९० पुरुष) र २०,२७६ (१०,४४० महिला र ९,८३० पुरुष) रुपमा रहेको छ। यी वडा निवासित जातिहरू जसले: भ्रामण, क्षेत्री, गुरुङ, मंगो, तामाडा, नेवार, कामी, अन्द्रुको बसोवास रहेको छ। र प्रयाश: यसले मानिसहरू सेवा, व्यवसाय, स्वास्थ्य, भौगस्थिता प्राप्त युवालाई, खानेपानी, बिजुली, दूरसंचार जस्ता प्रयासहरु: भौतिक सेवा, सुविधाका पूर्वाधारहरू र सामाजिक सेवाका पूर्वाधारहरू विद्यालय, स्वास्थ्य सेवा केन्द्र आदि उपलब्ध छ । पोखरा नेपालको प्रमुख पर्यटकीय स्थल हो र यहाँको गुण धातिक स्थलहरू तात्त्विक बनेको छ। जसले चिकित्सक, विश्व शान्ति स्थलमा लगायतका रहेका छन्।

५. वातावरण भ्रामको पहिचान, मूल्यांकन र आकलन

राष्ट्रिय वातावरण भ्रामको मूल्यांकन रिपोर्टका, १९९३ बमोजिम वातावरण भ्रामक मूल्यांकन गरिएको छ | जसअनुसार वातावरण भ्रामको आकार, शैक्ष र समय अन्तरिक्षात ध्यान दिइ प्रभाव मूल्यांकन गरिएको छ । वातावरण भ्रामक ३ वर्षसम्म रहेको छ जसो अवधिको प्रभाव र २० वर्ष भन्दा शालिक रहेको प्रभावलाई लागो समयको प्रभाव भनि वर्तिका गरिएको छ।
प्रतिकूल प्रभावहरू

विकल्पको विश्लेषण

विकल्पको विश्लेषण वातावरणीय प्रभाव मुल्यांकनको एक अभिन्न अंग हो। खास गरी विषमन्न आयोजनाहरूको सम्भाव्यता अध्ययन तथा आर्थिक लगानालाई अवसर र वातावरणीय दिग्दर्शनालाई लागि विकल्पहरूको विश्लेषण गर्ने गरिन्छ। यस मेडिकल कलेजको लागि प्रविधि व्यवस्थापन संचालन प्रक्रिया सम्बन्धहरूको विकल्पको विश्लेषण गरिएको छ।

निरकरणका उपायहरू

यस कलेज संचालनले गर्दछ वातावरणमा अनुपल्क र प्रतिकूल दुवै किसिमको प्रभाव गर्ने देखिन्छ। प्रतिकूल प्रभावहरूलाई प्रस्ताव गरिएका वातावरणीय प्रभाव न्यूनिकरणका उपायहरू द्वारा सम्बन्धित राष्ट्रिय स्तरका र स्थानीय स्तरका नीति नियम, निर्देशिका, कोड आदिको अनुशरण गरिएको छ र नीति नियम र कानूनको काठामो र राष्ट्रिय र राज्यीय स्तरको साथ पालना समेत गरिएको छ। कलेजको हाल संचालन भईसिएको शिक्षा अस्तित्वको उत्पन्न हुन सक्ने विषमन्न प्रतिकूल वातावरणीय असरहरूको न्यूनिकरण गर्ने स्वास्थ्य सेवाजन्य फोर्मलेटा व्यवस्थापन, संक्रमण नियन्त्रण, हारियाली व्यवस्थापन तथा प्रशिक्षण, लैब्स, व्यवस्थापन तथा आयोजनालाई प्रक्रिया, कलेजको उपलब्ध भौतिक पृष्ठभाषाहरूको समेतसंसाधन, सरस्फाई जस्ता शक्तिमत विषमन्न कार्यहरू गर्दै आएको छ। यस वातावरणीय प्रभाव मुल्यांकन प्रतिकूल प्रभावहरूले कलेज संचालन गर्दै उत्पन्न हुने वातावरणीय प्रभावहरूको मुल्यांकन गरी प्रतिकूल प्रभावहरू।
न्युनिकरणका उपायहरू प्रस्ताव गर्दौ, हाल भएका प्रयासहरूको समेत पुनरावलोकन गर्दौ थप न्युनिकरणका उपायहरूको सिफारिख गरिएको छ।

सकारात्मक प्रभावलाई अभिवृद्धि गर्न तथा नकारात्मक प्रभावलाई न्युनिकरण गर्नका लागि सिफारिख गरिएका केही प्रमुख उपायहरू हो ।

7.1 अनुकूल प्रभाव अभिवृद्धिका उपायहरू:

- कलेजको संचालनमा योजना अनुसार स्थानीय स्तरमा उपलब्ध जनशक्तिलाई प्राथमिकता दिने नीतिलिङ्ग छ।
- कलेज तथा स्वास्थ्य सेवामा कार्यरत विशिष्ट विधाका कर्मचारीहरूको लागि दक्षता र सीप अभिवृद्धिका अवसरहरू दिने तथा त्यस सम्बन्धी कार्यक्रममा संचालन गर्न।
- स्थानीय क्षेत्रमा सामुदायिक तथा भौतिक पूर्वधार विकासका कुरामा स्थानीय तहसंग समन्वय गर्दै सहयोग गर्न।
- संकारको स्वास्थ्य अनुसार 20 प्रशिक्षित जेहेद्दार विद्यार्थीयालाई पूर्ण छाग्रुङ्तित प्रदान गर्न।
- स्थानीय क्षेत्रमा स्वास्थ्य सम्बन्धी विशिष्ट जनकेतनाका कार्यक्रमहरू, स्वास्थ्य शिविर तथा स्वास्थ्य प्रशिक्षण कार्यक्रमहरू नियमित रूपमा संचालन गर्न र भविष्यमा यसलाई थप विस्तार गर्न।

7.2 प्रतिकूल प्रभाव न्युनिकरणका उपायहरू:

संचालन वर्गः

- उत्पन्न स्वास्थ्य सेवाजन्य फोहरमैलाको लागि राष्ट्रिय स्वास्थ्य सेवाजन्य फोहरमैला व्यवस्थापन निर्देशित, २०७१ अनुसार व्यवस्थापन गर्न।
- फोहरमैलाको प्रृक्ति अनुसार जैविक, अजैविक, कागज, प्लास्टिक र खतराजन्य फोहर श्रेणीमा नै विनिर्गण्य गर्न र छुडाउँदै संकलन गर्नका लागि पर्याप्त संख्याको फोहरमैलाको कलेजलाई विशिष्ट ठाउँमा राख्न।
- समस्तिध्य सशिकारीहरूलाई स्वास्थ्यसेवाजन्य र साधारण फोहरको व्यवस्थापन सम्बन्धमा समन्निधिम दिन।
- कलेजमा आपूर्ति गरिएको खानेपानीलाई आवश्यक शुद्धिकरण पछि मात्र प्रयोगमा ल्याउने र समयसमयमा नियमित रूपमा खानेपानीको गुणस्तर परीक्षण गरिएको।
- कलेज परिसरका ठल तथा नालीहरुको नियमित सरसफाई, मर्मसंभार गर्न।
- अर्थमान्बित सकेको फोहरपानीलाई मनाइएको फोहरपानी प्रस्थापन गर्नको नियमित मर्मसंभार गर्दै संचालन गर्नका लागि दक्ष प्राविधिक खटाउने र समय समयमा प्रशोधित फोहर पानीको मापदण्ड अनुरुप भए नभएको अनुरुपन गर्न।
- कलेजमा भएका सबै भौतिक पूर्वधार जस्तै भवन, खानेपानी आपूर्ति प्रणाली, ठल तथा नाली आदिको नियमित मर्मसंभार गर्न।
• वातावरणमैत्री जेनरेटरको व्यवस्था गर्न तथा समय समयमा नियमित रमेत संभार गर्न।
• पर्याप्त पारिज गुणितको व्यवस्था मिलाउने र व्यवस्थित पारिजको लागि छुट्टे कर्मचारी खटाउने। आवश्यक स्थानहरूमा ट्राफिक संकेतको व्यवस्था गर्न।
• विद्युत व्यवस्थापनको गरी तयारीका कायरहर गर्न। कलेजका बचनहरूको भूकम्पीय जोखिम मूल्याङ्कन गर्न तथा आपत्तिकालिन प्रतिकाय का लागि आवश्यक तयारीका कायरहर गर्न।
• आगाधिनाविराज सरकारका लागि आवश्यक उपकरण, तालिम र drill अभ्यासको व्यवस्था गराउने।
• अस्पताल परिसरमा सर्व स्विच परिवर्तनका लागि संग्रहण नियमण प्रणाली अनुवादन गर्न।
• स्वास्थ्य तथा सुरक्षा सम्बन्धित सवालमा सबै कर्मचारीलाई चेतनामूलक तथा तालिम कायरमहरू संचालन गर्न।
• जोखिमपूर्ण रसायनिक सामग्रीलाई सुरक्षित तत्वबाट भण्डरण तथा व्यवस्थापन गर्न।
• प्रस्तावित र विविधको उपकरण संचालनमा काम गर्न कर्मचारीलाई छुट्टी सुरक्षित पोषकको व्यवस्था गर्न।
• कलेज क्षेत्रमा हरियालीको यथ विकास गर्न।
• कलेजको साइटका शौचालय, आवास लगायतका स्थानहरू सरसफाई यथ उद्योग गर्न।

८. सम्बन्धित नीति, नियम, कानून निर्देशिकाहरूको पुनरावलोकन
वातावरणीय प्रभाव मूल्याङ्कन अध्ययन गर्न यस सम्बन्धित विविध नियम कानून र नीतिहरू अध्ययन गरिएको छ, नेपाललाई संचालन (धारा 30: स्वास्थ्य वातावरणमा बौद्धिक पात्र पाउने हक, धारा 35: स्वास्थ्य सम्बन्धित हक), राष्ट्रिय स्वास्थ्य नीति २०७१, राष्ट्रिय शहरी नीति २०५४, स्वास्थ्य सम्बन्धित दोस्रो दौरकालीन योजना (२०५४-२०७४), चौथौ लाङ्ग वर्ष योजना (२०७३-२०७६), वातावरण संरक्षण ऐन, २०५३, वातावरण संरक्षण नियमावली, २०४१, भवन ऐन (२०४१) र नियमावली (२०४६), भवन ऐन (२०४४), स्थानीय सरकार संचालन ऐन (२०४२) र नियमावली (२०२२), नेपाल विकित्सा परिदृश्य ऐन (२०२०) र नियमावली(२०२०), जलचर संरक्षण ऐन (२०३१), भू-संरक्षण ऐन (२०३१), वातावरणीय प्रभाव मूल्याङ्कन निर्देशिका (२०३०), राष्ट्रिय वायु गुणस्तर माध्यम (२०६२), राष्ट्रिय खानेपानी गुणस्तर माध्यम (२०६२), राष्ट्रिय स्वास्थ्य-सेवामध्य सरकार मोहिनी व्यवस्थापन निर्देशिका (२०७१), लगायतका नीति, नियम, निर्देशिका र अन्य अन्तरराष्ट्रीय सचिव सम्बन्धित हरूको पनि अध्ययन, पुनरावलोकन गरिएको छ।

९. वातावरणीय व्यवस्थापन योजना
वातावरणीय व्यवस्थापन योजना वातावरणीय प्रभाव मूल्याङ्कनको अभ्यास अंगको रूपमा रहेको छ। वातावरणीय प्रभाव मूल्याङ्कनको मुख्य उद्देश्य मै निर्मितका उपायहरूको रणनीती पतै गर्न आयोजनाको निर्माण र संचालनको समयमा वातावरणीय प्रभावहरूको कम गर्नु हो। वातावरणीय प्रभावहरूको कम गर्न प्रस्ताव गरिएका निर्मितका उपायहरूको कार्यान्वयन सुनिश्चित गर्न आवश्यक संस्थागत संचालन, कर्मचारी, समन्वय, रिपोर्टिङ र बजेटको व्यवस्था गरिएका वातावरण व्यवस्थापन योजना तर्कुमा गरिएको छ। यस कलेजले प्रतिकूल वातावरणीय प्रभाव निर्मितका उपायहरूको कार्यान्वयनका लागि र ११.३६,३२,७४६ खर्च गरिएको छ। प्रस्तावित थप र ३.५०,७७,६६६ समेत गरि कुल र २५४,३२,७४६ खर्च गर्न यस प्रतिवेदनमा
सिफारिश गरिएको छ। यस बाहेक कलेजलाई थप वातावरणमैत्री बनाउन र वातावरणीय दीर्घमा कायम राखन आवश्यक पर्छ सन्तप्त कार्यहरुका लागि पति कलेजले समय र आवश्यकता अनुसार थप बजेटको व्यवस्था गरेको छ। वातावरणीय व्यवस्थापन योजनाको कार्यहरुका अनुगमनका लागि ₹ ७५०,०००/-% खर्च प्रस्ताव गरिएको छ। यससँग वातावरणीय व्यवस्थापन योजनाको लागि कुल बजेट ₹ ५४७४३२६३० व्यवस्था गरिएको छ।

10. वातावरणीय परीक्षण (Environmental Auditing)

वातावरण संरचना निर्माणवाली, २०५४ को दफा १४ अनुसार वातावरणीय प्रभाव मूल्याङ्कन अध्ययन गरिएको प्रस्तावहरूको वातावरणीय परीक्षण आयोजना सम्पन्न भएको दुई वर्षपछि वन तथा वातावरण मन्त्रालयले गरेको परि स्थानीय व्यवस्था गरेको छ। वातावरणीय परीक्षणको लागि आवश्यक पर्न जनशक्ति र बजेटको व्यवस्था गरिएको छ। कार्यहरुका घरमा यस प्रतिवेदनमा सहभाष्य गरिएको छ।

11. जनसहभाषिता

वातावरणीय प्रभाव मूल्याङ्कन अध्ययनमा नेपाल सरकारले कानुनी प्रावधानहरू मार्फत स्थानीय समुदायको सहभाषितालाई सुनिश्चितता प्रदान गरेको छ। वातावरण संरचना ऐन, २०५३ को दफा ५(१), ५(२) र १९(२) ले स्थानीय जनसमुदायलाई वातावरणीय प्रभाव मूल्याङ्कन प्रकृतियामा सहभाषिता हुने सुनिश्चितता प्रदान गरेको छ। वन तथा वातावरण मंत्रालयबाट स्वीकृत कार्यसूचिका आधारमा वातावरणीय प्रभाव मूल्याङ्कन प्रतिवेदन तथा पारदी स्थलगत अध्ययनका क्रममा स्थानीयसािृत भएका छ। अन्तर्राष्ट्रीय तथा कुराकानीका क्रममा उठेका स्वातांत्र्य समेत सम्बोधन गरिएको परि समय साधारण मूल्याङ्कन प्रतिवेदन तथा पारदीको भएको यस मध्येदा प्रतिवेदन उपलब्धि गरिएको छ।

12. उपसंहार

वन तथा वातावरण मंत्रालयबाट विभिन्न समयमा जारी गरिएका ऐन, नियम र निदेशिकाहरुको पालना गरी यो वातावरणीय प्रभाव मूल्याङ्कन प्रतिवेदन तथा गरिएको छ। प्रस्तुत वातावरणीय प्रभाव मूल्याङ्कन प्रतिवेदनमा यस कलेजले संचालनसँग विद्युमान भौतिक, जैविक र आर्थिक, सामाजिक तथा सांस्कृतिक वातावरणमा पाँच अनुकूल र प्रतिकूल प्रभावहरू सामेल गरिएको छ। कलेजतथा शिक्षण अनुपालनको संसाधनबाट सिजियत नकारात्मक प्रभावहरू पार्। अन्तर्राष्ट्रीय स्तरको छन्। र त्यसको निरन्तरकालिक लागि कलेजले विभिन्न उपयोग साधारण मूल्याङ्कन प्रमुख व्यवस्थापिका गरिएको छ। यस प्रतिवेदनमा सिफारिश गरिएका अन्य थप न्यूनिकरणका उपायहरूबाट साधित गर्न सक्नुहोस्। यस प्रतिवेदनमा उल्लेख गरिएका प्रतिकूल प्रभाव न्यूनिकरणका उपायहरूको प्रस्तावनका र व्यवस्थापन प्रतिवेदनले साथै वातावरण सम्बन्धी त्यसको लागि अनुगमन समेत गर्न गरी कलेज तथा शिक्षण

मणिपाल विकल्प्स विज्ञान कलेज, पोखराको वातावरणीय प्रभाव मूल्याङ्कन प्रतिवेदन
अस्पताल गर्नु उपयुक्त हुने निष्कर्ष रहेको छ। वातावरणीय प्रभाव मूल्याङ्कन अध्ययन यस प्रस्तावका अपेक्षित वातावरणीय प्रभावहरूको सम्बोधन गर्न पर्याप्त रहेको छ।
EXECUTIVE SUMMARY

1. BACKGROUND

Nepal is one of the developing countries in the world. The infrastructure facilities for health and medical institution are far below the standards when compared to other developed countries. For last few decades government has emphasized on improving access to health care. The Government of Nepal is initiating lot of information, education and communication program and showing high enthusiasm to start new Medical College in different parts of this country both rural and urban. Although health service is the major responsibility of the government, considering the limited and multitude problems being faced by the country, it is impractical to hope and demand that the government only will be able to solve the huge problems in short time.

Manipal College of Medical Sciences (MCoMS) was established in year 1994 A.D. with a goal; to earn itself the name of international fame by imparting quality education to the learners of medical and health sciences education, develop competent human resources for health who shall provide quality health care services to the people of Nepal in particular and the people of the “global community” in general.

Accordingly, Manipal College of Medical Sciences (MCoMS) is in operation with a vision to produce locally trained and qualified doctors and medical professionals on one hand and providing qualitative and standard medical facilities to the people of inside and outside Pokhara valley.

2. THE PROPOSENT

The proponent of the proposal is Manipal College of Medical Sciences (MCoMS). The company’s address for official correspondence is given below.

Organization : Manipal College of Medical Sciences
Address : Phulbari, Pokhara Metropolitan city-11, Kaski, Nepal
Contact Person : Bhanu Bhardwaj (Head, Admin/Human Resource)
Tel : +977-61-526416/526420
Fax no : +977-67-527862
Email : MCoMS@manipal.edu.np
Website : www.manipal.edu.np

3. PROJECT DESCRIPTION

Manipal College of Medical Sciences (MCoMS) is a service-oriented company established in 1994 A.D, with the prime objective of promoting private medical college to produce locally trained and qualified medical doctors and provide qualitative and
standard medical facilities. It undertakes undergraduate, graduate and postgraduate levels of programs in different disciplines of Health Sciences education. MCoMS Teaching Hospital provides various facilities with the operation of the different departments giving facilities for the Inpatients and Outpatients with total 750 beds. It has been providing services through In-patient departments and out patients departments. Also teaching hospital has 8 separate departments for good academic operation with total 100 seat in MBBS, and 40 seats in BSc and 40 PCL nursing. There are sufficient no. of hostels running to provide accommodation facility to students.

4. **EXISTING ENVIRONMENTAL CONDITION**

**Physical Environment**
The project area lies in ward No. 11 and 16 of Pokhara Metropolitan in kaksi district with warm and temperate climate and frequent rainfall. The hospital lies in the flat and stable land near the edge of Kanhu hill, so the air and noise quality is seems good. The Seti river is found in th vicinity of the hospital.

**Biological Environment**
There are no sensitive areas such as National Parks, Wildlife Reserves and Conservative area or any other kind of environmental sensitive area. There is small patches of forest area in the north diretion. It does not contain any endemic or endangered floral species in its territory.

**Socio-economic & Cultural Environment**
The total household numbers of Ward 11 and Ward 16 are 14,716 (Female: 7,597 and Male: 7,119) and 20,278 ((Female:10,448 and Male: 9,830). The ethnic composition of in these wards of Pokhara Metropolitan is mixed of Brahmin, Chhetri, Gurung, Magar, Tamang, Newar Kami and others and mostly employed/ service, agriculture, Business, Crafts and others. As it is situated in the urban area there are facilities like transport, road, watersupply, electricity, telecommunication and other physical infrastructure and social infrastructure such as school, health services etc. Pokhara is major tourism Hub in Nepal. Major religious sites are Taal Barahi, Bindhyabasini, World Peace Pagoda and others.

5. **IDENTIFICATION, PREDICTION AND EVALUATION OF ENVIRONMENTAL IMPACTS**

The Environmental impacts are 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).

**Beneficial Impacts**
The major benefical impacts due to the operation of the project are production health professionals, economic growth and improved health status of the project area as well the
outside of the project area. The job opportunities for local and outsiders have helped to improve the living standard of many people. The hospital also pays revenue to government which ultimately increases local economy. Till date, College has produced 2,253 MBBS doctors, 197 postgraduates, 100 in Bachelors in Nursing and 513 in PCL in Nursing skilled human resources. Similarly, it has created employment opportunities and 308 persons from the Pokhara have got employment opportunities in the college. 1,000 patients from the teaching hospital and 400 patients from the OPD has daily received medical services in an average and this college is recognized as medical institution providing specialities service in the Pokhara area. Various socio-economic activities increased in the area after the establishment of the college has contributed in socio-economic development of the area.

**Adverse Impacts**

In the operation phase, main adverse impacts that are issues related to solid and health care waste, discharge of wastewater, traffic management, occupational health and safety, energy requirement, disaster management (Emergency preparedness and response), use of hazardous chemicals, use of radiating equipments, disinfecting and sterilization systems. Change in income/expenditure pattern, socio-cultural values could also be observed in project vicinity.

6. **ALTERNATIVE ANALYSIS**

Alternative analysis is an integral part of the EIA 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 project has been done mainly in technology management methods, operational procedures etc.

7. **MITIGATION MEASURES**

There are both beneficial and adverse impacts on the environment due to project implementation. Adverse impacts can be mitigated through mitigation measures. The project shall follow all the rules, regulation and guidelines on project implementation and strictly adhere with the national rules, regulation, guidelines, code and standard for the protection of the environment. Various activities like health care waste management to minimize the impacts of the health care waste, infection control, greenery management and promotion, disaster management and emergency response, repair and maintenance of physical infrastructures of the college, sanitation etc. have been done. This EIA study has analyzed the environmental issues and predicted the environmental impacts and suggested mitigation measures for each of the identified impacts. The mitigation measures for each of the identified impact have been proposed.

Some major recommendations made for the benefit augmentation measures for the beneficial impacts and mitigation measures for adverse impacts are as given below:
7.1 Benefit Augmentation Measures

- Local human resource preference policy according to merit to fulfill the requirement of technical, administration and skilled human resource will be ensured.
- Preference will be given to local human resource to fulfill the requirement of skilled human resources such as in technical and administrative field.
- MCOMS will provide opportunity to work together with qualified and experienced technical and managerial personnel
- MCOMS will coordinate with the local government & CBO’s in local area infrastructure development eg: road maintenance, drainage facility etc
- MCOMS will also provide some scholarship to good national students as per condition stipulated by the Government, 20 percent full scholarship will be allocated.
- Various kinds of health awareness programs such as health camps, training programs will be organized and further extended regularly at local level.

7.2 Adverse Impact Mitigation Measures

Operation stage

- MCOMS will follow the National Health Care Waste Management Guidelines (2071) to manage the health care wastes.
- Allocation of enough color indicated dustbins at various places to separate biodegradable, non-biodegradable, papers, plastics and risk waste.
- Inhouse training to newly appointed staffs on the Healthcare and General waste management
- Use of drinking water only after treatment and drinking water quality will be regularly monitored.
- Timely repair and maintain all the infrastructure of the college; building, water supply, drainage and sewerage system,
- Appoint technically qualified staff for operation & maintenance of ETP and regular monitoring of the treated effluent.
- Provision of environment friendly generator and its timely maintenance of generator.
- Allocation of sufficient parking area and provide separate staff to avoid haphazard parking. Provide traffic signals in necessary places.
- Disaster preparedness will be done. Seismic vulnerability assessment of college buildings will be done and necessary works will be done for the emergency response.
- Necessary fire safety equipment, training will be provided and drills will be carried out.
- Infection control system will be adopted within hospital premise.
- Awareness programmes and training will be provided to all staffs on occupational health and safety issue.
- Hazardous chemicals will be stored and managed in a safe manner.
- Separate dress will be provided to staffs working in laboratories and handling radioactive equipment.
- Greenery will be promoted in the college and surrounding area.
- Maintain proper hygiene in the kitchen area and provide proper sanitation facilities like tissue rolls, soaps, water, etc.

8. REVIEW OF LEGISLATION, POLICIES, LAWS, STANDARDS AND GUIDELINES


9. ENVIRONMENTAL MANAGEMENT PLAN

An Environmental Management Plan (EMP) is an important part of Environmental Impact Assessment (EIA) report. The purpose of EIA 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 EIA, 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.

The existing mitigation measure cost that MCoMS has been taking is NRS.113,732,746 and the proposed additional mitigation measure to be taken is NRS34,099,984 i.e. total mitigation cost will be Nrs147,832,730. The Project after operation will conduct regular monitoring and has allocated Rs. 550,000 as the monitoring cost. The budget for implementation of environment management plan is NRS 149,032,730.
10. ENVIRONMENTAL AUDIT

Rule 14 of the EPR, 1997 requires MoEST to undertake an Environmental Audit of a project subjected to EIA, after two years of the commencement of service. An audit plan, required human resource, budget, with auditing parameter method, location and indicators has been proposed.

11. PUBLIC PARTICIPATION

The Government of Nepal had provided opportunities to the local community to involve in the EIA process through the legal frame work. The Environment Protection Act, 1997 rule 4(1), 7(2) and 11 (2) facilitates the local community to take part in different stages of EIA process. The proponent of this EIA study has strongly followed these legal provisions during the study. Issues raised by the local people in interaction, discussions and talk with local people during field study as well as opinions, suggestion, reaction expressed by the Public Hearing program organized in Kartik 30, 2075 B.S. are also incorporated in Final EIA report and submitted to the Ministry for the approval.

12. CONCLUSION

The study fully complies with the Nepal Government Rules, Regulations and Guidelines and strictly follows the EIA procedures prescribed by the Ministry of Forests and Environment. The EIA study has found beneficial and some adverse impact to the existing physical, biological and socio-economic environment. EIA study has identified, predicted and evaluated the beneficial as well as adverse impacts and it has also suggested mitigation, elimination or minimization measures of adverse impacts and augmentation of beneficial. The beneficial impacts out-weigh the adverse impacts and it is possible to eliminate or minimize the adverse impacts by carrying out the environmental management plan as a part of project development suggested in the report.

The EIA is sufficient enough to address the anticipated environmental impacts of the proposal.
CHAPTER 1: INTRODUCTION

1.1 PROPONET AND THE ORGANIZATION RESPONSIBLE FOR PREPARATION OF EIA STUDY

The proponent of the proposal, Manipal College of Medical Sciences is registered as a service-oriented Company under Company Act of Nepal. It is registered in Company Registrars’ Office and has also taken necessary approval from Ministry of Health and Population and MCOMS got the letter of Intent (LoI) in from Ministry of Education, Science and Technology to operate Medical College and Teaching Hospital.

The company’s address for official correspondence is given below.

Organization : Manipal College of Medical Sciences
Address : Phulbari, Pokhara Metropolitan-11, Kaski
Contact Person : Bhanu Pratap Bhardwaj (Head, HR and Administration)
Tel : +977-61-526416/526420,
Fax : +977-67-527862
Email : MCoMS@manipal.edu.np
Website : www.manipal.edu.np

1.2 ORGANIZATION RESPONSIBLE FOR THE PREPARATION OF THE EIA REPORT

Manipal College of Medical Sciences has entrusted Environmental Services Nepal Pvt. Ltd. with the task of carrying out an Environmental Impact Assessment (EIA) study of the proposed project and preparing EIA report thereof. The contact address of the consultant is given below:

Environmental Service Nepal (P) Ltd.
Central Business Park, Thapathali, Kathmandu, Nepal
P.O. Box: 11605
Tel -: 01-4101695
Email: info@esn.com.np
Website: www.esn.com.np

EIA Study team:

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<th>S. N</th>
<th>Key Experts/specialist</th>
<th>Persons involved</th>
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<tr>
<td>1</td>
<td>Team Leader/EIA Expert</td>
<td>Niranjan Shrestha</td>
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<td>2</td>
<td>Civil/Environmental Engineer</td>
<td>Nainisha Subedi</td>
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<td>3</td>
<td>Socio-economist</td>
<td>Munesh Upadhyaya</td>
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<tr>
<td>4</td>
<td>Ecologist</td>
<td>Dipesh Pratap Shrestha</td>
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1.3 PROJECT BACKGROUND

Nepal is one of the developing countries in the world. The socio-economic condition, the educational status of people, the morbidity and mortality of diseases and the infrastructure facilities for health and medical institution are far below the standards when compared to other developed countries. The delivered basic health services in 2072/73 were the 104 public hospitals, the 303 private hospitals, the 202 Primary Health Care Centres (PHCCs) and the 3,803 health posts. Primary health care services were also provided by 12,660 Primary Health Care Outreach Clinic (PHCORC) sites. (Annual Report DoH 2072/2073). There are 20 medical colleges in Nepal till 2015, fourteen (74%) were private and eight (43%) were in Kathmandu Valley, Of the 12 medical colleges outside the Valley, almost all were based in the cities, largely depriving health care from those living in rural regions of Nepal (Lancet, 2012). The number of medical schools, apex hospital, primary health care centers and facilities for minor ailments are only concentrated in the urban areas but quite inadequate to serve the purpose. Extension of access to health care services and improving the quality of health care still remains a major challenge. The expansion of urban health services, owing to rapid urbanization is an additional burning challenge.

For the last few decades, the government has emphasized on improving access to health care services by expanding health facilities and strengthening community-based interventions. The Government of Nepal is initiating lot of information, education and communication program and showing high enthusiasm to start new Medical College in different parts of this country both in rural and urban area. The participation of private sector has been increased. There is high demand for the human resources required for almost all levels of health care to be produced within the county. Also, country is increasingly becoming capable of producing high and medium level health sector human resources. Likewise, though the services are not widely available, a number of specialized care facilities relating to eye, cancer, heart, kidney, neurology, orthopedic, and plastic surgery have been established under Government and Non-Government sector. Diagnostic centers and lab services have been strengthened and expanded.

Realizing the demand of a Medical College in Nepal, Manipal College of Medical Sciences was established in year 1994 A.D with a goal; to earn itself the name of international fame by imparting quality education to the learners of medical and health sciences education, develop competent human resources for health who shall provide quality health care services to the people of Nepal in particular and the people of the “global community” in general. The concept works with the prime objective of promoting private medical college and teaching hospital to produce locally trained and qualified medical doctors on one hand and providing qualitative and standard medical facilities in Nepal. Although health service is the major responsibility of the government, considering the limited and multitude problems being faced by the country, it is
impractical to hope and demand that the government only will be able to solve the huge problems in short time.

Milestone Dates:

- Establishment of undergraduate medical degree program in 1994 with an annual intake of 100 admissions
- Affiliation with the Kathmandu University with effect from 31st December 1994
- Commencement of the 750-bedded Manipal Teaching Hospital in 1998
- Full and permanent recognition by the Nepal Medical Council on 6th August 1999
- Recognition by the Sri Lankan Medical Council on 24th August 1999
- Listing of college in the WHO directory of Accredited Medical Schools enabling the graduates appear for various international licensing exams e.g. USMLE, PLAB etc.
- Recognition by the British Columbia Student Assistance Program (BCSAP) and Ontario Student Assistance Program (OSAP), Canada
- Recognition of the MBBS degree by the Government of India under Section 12(2) of the IMC Act 1956 on 26th September 2001
- Establishment of postgraduate degree programs in Pathology (MD) and other Basic Sciences (MSc) subjects in 2000
- Commencement of allied health sciences (BMLT & BMIT) degree programmes in 2001
- Increase of the annual intake from 100 to 150 in respect of the undergraduate medical degree program (MBBS) in August 2003 split into two batches of 75 each commencing in August and February each year
- Extension of the postgraduate degree programme to Internal Medicine (MD) in 2005
- Extension of the postgraduate degree program to all other disciplines in 2007-2008
- BSc Nursing program commenced with 20 seats in August 2009, enhanced to 30 subsequently
- Merger of the August and February intakes of 75 into one batch of 150 with effect from 1st August 2010.
- Commencement of DM (Cardiology) program in Feb 2013
- Addition of a number of ultra-modern speciality services including NICU, Neuro Surgery, Linear Accelerator, Spiral CT Scan, MRI etc. in the Manipal Teaching Hospital and continuous upgradation of existing hospital services which include addition of latest equipments e.g. Phaco in the Ophthalmology dept, ICU’s equipped with Ventilators and Monitors etc.
- No capitation fee – a remarkable achievement in the field of medical education
- International Students and Faculty Members at the Campus – Since its inception the college has been attracting international students and the number is increasing every year in view of the global teaching standards employed at MCOMS. The college has also been successful in attracting international faculty members.
- A large number of graduates are placed at various prominent international health care institutions after passing out the international medical licensing exams e.g. USMLE & PLAB with scores up to 99%.
1.4 RATIONALE OF THE EIA STUDY

As per EPR, 2054 (1997) and its subsequent amendment, an EIA is mandatory for the Hospitals of more than 100 bed and that falls under Schedule II of EPR, 2054. Since the project (MCoMS) is in operation with more than 100 beds, falls in Schedule II of EPR, 2054, it requires an EIA study. MCoMS received the Letter of Intent from Ministry of Education, Science and Technology in 2053/09/04 B.S. (before promulgation of EPR, 2054) with required capacity of teaching hospital (7 bed for one student quota; 100 bed hospital at initial stage and extension of hospital up to 750 bed) and other necessary facilities. Total capacity of Manipal Teaching Hospital, a hospital of Manipal College of Medical Sciences (MCOMS), Pokhara, is 850 beds. Hence the same was considered while drafting Scoping Document of EIA in 2016. However, as per the Accreditation Standards for the MBBS Program issued by Nepal Medical Council in 2017, the requirement is only 750 beds (Student to bed ratio 1 : 5). In view of the above, it is clarified that total capacity still remains 850 beds and functional bed capacity is 750 beds. As MCOMS did not carry out the EIA study in establishment phase and the EIA study is now being carried out. (EPA, 2053 (1997).

The rationality of conducting the EIA study for MCoMS is as follows adapted from National Environmental Impact Assessment Guidelines 1993):

- Identify environmental impacts on project area before development of the proposal;
- Reduce adverse environmental impacts; and
- Make MCoMS development and operation environmentally sustainable.

1.5 OBJECTIVES OF EIA STUDY

The main objectives of EIA study of MCoMS are to:

- Identify and predict both beneficial and adverse impacts of the proposal on the physical, biological, socio-economic and cultural aspects of the environment, with proper methodological data acquisition procedures and analysis methods and techniques, in terms of magnitude, extent and duration that may be expected to occur during construction of hostel building and operation of medical college
- Sort out significant and important impacts from the identified and predicted impacts, with proper impact evaluation methods and techniques, and assess whether adverse impacts can be avoided or mitigated
- Examine and select the optimal alternative from the various relevant options available so that the significant and important adverse impacts can be avoided or brought to a minimum
- Recommend preventative, curative or compensatory measures for the significant and important impacts for the finally selected optimal alternative of the project
- Inform decision-makers, and related stakeholders about the environmental implications of the project and assess whether the proposal can go ahead
- Prepare environmental management plan that includes implementation plan for environmental protection measures/environmental benefits augmentation measures, plan for environmental monitoring and plan for environmental auditing.

1.6 STUDY METHODOLOGY

The EIA study methodology is followed according to provisions of EPA, 1997 and EPR, 1997. Following steps has been taken to carry out the EIA study.

Desk study and Literature Review
Consultation has been done with the proponent to enhance the understanding on the project and its potential issues. Review of the approved EIA, ToR and scoping documents. Preparation of the questionnaire and checklist was done in consultation with the team to collection information on mainly socio-economic and partly of biological and physical aspects. Data and information from secondary sources such as Project Document of MCoMS, various published and unpublished reports and articles available from different government as well as non-governmental offices and libraries have been collected and reviewed. Similarly, other related documents such as policies, acts, rules, directives and guidelines have been collected and reviewed. Resources available in the internet were also reviewed.

Project Area Delineation
For the purpose of the EIA study, the study area is defined as the project area consisting of the project site as well as the area that are impacted due to the operation of the medical college. Depending on the impacts, the project zone of influence is defined on the basis of perceived direct and indirect impacts zone due to the project activities.

a) Direct Impact Zone
The direct impact zone area around 250 meters radius, consisting of the project structures, facilities and area that are impacted by the operation of the project and fenced off for safeguarding of various structures and facilities as well as the area permanently used by the project. The nearby settlements of concerned wards in which project structures and facilities are located are considered "direct impact zones". This area is also defined as the “Core areas”.

b) Indirect Impact Zone
The term "indirect impact zone" with area beyond the 250 meters indicates a greater area, which is directly or indirectly be influenced by operation of the project. This area includes the concerned ward of project area where no project structures and facilities are located. This area is also defined as “surrounding area”.

Field Study and Inspections
Field visit was organized (Jestha 28- Asar 5, 2075) to study and inspect the medical college areas. Observations have been made by related experts during field visits. Interactions were carried out to collect the field level and primary information. These field visits were also used for informing the local people about the EIA study of medical college.

The data and information collected were relating to physical, biological, socio-economic and cultural aspects of the project area. These include population, households, major economic activities, social services, literacy, health aspects, utilities, infrastructure facilities, flora and fauna, endangered species, beliefs and traditions, cultural and archeological heritages, waste generation and disposal facilities, status of pollution. Following tools were applied for the collection of databases on the physical, biological, chemical and socio-economic and cultural environments.

**Physical environment**

The extensive field observations and inspections were done to collect the physical environment data. Other related informations on the topography, geology, hydrology, landuse, air quality etc were analyzed from the secondary informations such as topographical maps, landuse maps, satelit imagery and additonal informations from the secondary source.

**Biological environment**

Data collections on biological environment were collected from the field observations. The study team talked with loca people and Interviews of Key Informants were taken to get information about the flora and fauna of the surrounding environment.

**Socio-economic and cultural environment**

Study utilized both primary and secondary information for socio-economic and cultural data collection. Participatory techniques such as focus group discussions with local community, people coming to hospital tp take the medical service and employees etc. were also held. Key Informant Interviews were conducted using structured and unstructured questionnaires and checklists with the relevant authorities and concerned persons. Questionnaires used have been presented in the Annex D. Other relevant datas were collected from secondary informations such as central bureau of statistics etc.

**Impact Identification and Prediction**

Data and information collected were used for the identification and prediction of environmental impacts. The baseline environmental conditions of the proposal area from secondary (literature review) and primary (field survey and FGD, Key Informant Interviews) sources were evaluated in relation to project activities during construction as well as operation.

As far as possible, the impacts were quantified. Uses of objective and subjective tools as given in the national environmental guidelines were made. The impact Summary Matrix
was employed for identification of the environment effect. In all the cases, the identified and predicted environmental impacts are grouped as Physical, Biological, Socio-economic and Cultural aspects. Considering the nature of the available secondary information and the primary information collected from the field, the analysis was mainly qualitative and based on Expert’s judgement (National EIA Guidelines, NPC/IUCN, 1993)

**Public Hearing/Participation**

After the preparation of draft EIA report, the proponent organized public hearing at MCOMS on 2075/07/30 B.S. For this, the proponent sent invitation letter to concerned stakeholders including local people and office of government line agencies, school, hospital, Municipality and the related ward office. Executive summary of the report was shared during public hearing and comments/suggestions received from the public hearing programme are incorporated in the EIA report. Copies of public hearing related documents are included in **Annex F of the EIA report**.

**Report Preparation and Approval**

The consultant prepared the draft report based on the approved ToR. The draft report is then submitted to the Municipality office and their recommendation letter is collected. The finalized report is submitted to the concerned government line agencies for the approval.
CHAPTER 2: PROJECT DESCRIPTION

2.1 PROJECT LOCATION

Manipal college of Medical Sciences (MCoMS) is located at Phulbari, ward no. 11 of Pokhara Metropolitan, Kaski in the western development region of Nepal at an altitude of 910 m above sea level. The hospital is situated at around 8km North East from Phewa Lake and about 6km North East from Prithvi Chowk. MCoMS nestled in the scenic, mountainous terrain of Pokhara valley so the atmosphere of hospital is found to be pollution free with quiet and pleasant atmosphere. Being located outside the core areas of Pokhara city, MCOMS areas found to be with less pollution, greenery, snow-clad peaks view in the distances besides the usual hospital activities within the premises. Being at the lap of mountainous range of Pokhara valley and well fenced hospital area noise pollution from the vehicular roads hardly reaches to the hospital indoor, outdoor patient and dormitories etc.

Figure 1: Location of MCoMS in Google Image
Figure 1 Location Map of the Nepal Medical College
2.2 OBJECTIVE OF THE PROPOSAL

The objectives of MCoMS are:

- Conduct undergraduate, graduate and postgraduate levels of medical education programs by embarking upon latest trends in medical education.
- Undertake undergraduate, graduate and postgraduate levels of programs in different disciplines of Health Sciences education.
- Provide quality tertiary health care services from Manipal Teaching Hospital and Sub-specialty Health Care and Research Centers.
- Provide general health services from community satellite health centers.
- Conduct continuing education programs.
- Carry out biomedical, sociocultural and epidemiological scientific research.
- Improve the health status of the people of Nepal by bringing in an impact on the health profile of the district where it is established and the country as a whole.
- Develop links with national and international universities/ institutions/colleges/ hospitals/organizations/societies/clubs/foundations/philanthropists and individuals in relation to conducting undergraduate, graduate and postgraduate levels of academic programs/providing health care/performing research/exchanging faculty/developing infrastructure/acquiring equipments/ collecting endowments/exchanging students/providing social services and overall achievement for the development and progress of Medical and Health Sciences Education and Health Care Service in Nepal.
- Become a self-reliant academic institution of per excellence for the graduate, post-graduate and doctoral level studies in Medical and Health Sciences Education and attain the status of a deemed technical university of medical and health sciences of international repute.

2.3 SALIENT FEATURES OF THE PROJECT

<table>
<thead>
<tr>
<th>Table 1: Salient features of the project</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Item</strong></td>
</tr>
<tr>
<td>Project Name</td>
</tr>
<tr>
<td><strong>Location:</strong></td>
</tr>
<tr>
<td>Municipality</td>
</tr>
<tr>
<td>District</td>
</tr>
<tr>
<td>Province</td>
</tr>
<tr>
<td><strong>Project Geography</strong></td>
</tr>
<tr>
<td>Latitude</td>
</tr>
<tr>
<td>Longitude</td>
</tr>
<tr>
<td>Altitude</td>
</tr>
<tr>
<td><strong>General Project features</strong></td>
</tr>
<tr>
<td>Hospital Area, Phulbari</td>
</tr>
<tr>
<td>Item</td>
</tr>
<tr>
<td>-----------------------------</td>
</tr>
<tr>
<td>Total Hospital Area</td>
</tr>
<tr>
<td>Open Space Area</td>
</tr>
<tr>
<td>Garden Area</td>
</tr>
<tr>
<td>Total number of car parking</td>
</tr>
<tr>
<td>Total number of bike parking</td>
</tr>
<tr>
<td>Legal Aspects of Hospital</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>No. of beds</td>
</tr>
<tr>
<td>Established Date</td>
</tr>
<tr>
<td>Specialty Departments and Services</td>
</tr>
<tr>
<td>Super-specialties Services</td>
</tr>
<tr>
<td>Diagonistic Services</td>
</tr>
<tr>
<td>Clinical Laboratory Services</td>
</tr>
<tr>
<td>Item</td>
</tr>
<tr>
<td>--------------------</td>
</tr>
<tr>
<td>Dylasis Unit</td>
</tr>
</tbody>
</table>

**Special Programs**

Safe Motherhood Programme – for institutional delivery
Hysterectomy Programme – for permanent sterilization
Dialysis Programme – for CRF patient harmodialysis service
General Surgery and ENT Surgery Programmes

*(patients do not have to pay amount for these services)*

**Cardiac Investigation:**

ECG, Holter (24-hour ECG)& TMT (Treadmill), 2-D Echocardiography, Angiography with DSA.
Unit(CCU) and Semi-CCU, Neonatal(NICU) and Pediatric ICU and Neurosurgical ICU.

**24 Hour Emergency and Trauma Services**

Well-equipped Emergency Room (ER) supported by Medical Intensive Care Unit (ICU), Coronary Care Unit (CCU) and Semi-CCU, Neonatal (NICU) and Pediatric ICU and Neurosurgical ICU.

<table>
<thead>
<tr>
<th>Outdoor Patients/ Day</th>
<th>Indoor Patients/ Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>55% of OPD</td>
</tr>
</tbody>
</table>

**Accommodation / Beds**

**GENERAL BED:** 5 patient beds in one room with attached toilet.

**PRIVATE:** Twin-sharing basis; 2 patients’ beds with 2 attendant cots in one room.

**SPECIAL:** Single accommodation with 1 patient bed with 1 attendant cot in one room with attached toilet, TV and telephone in the room. All beds are provided with a bed-side table unit, mattress, and bed-linen with blanket. Heater is provided on request (to Nurse). Bed-pans, urine pots are provided by Nurse as per requirement, and also on request.

**Social Responsibility**

MCOMS deliver primary and secondary health care services through its Satellite Community Health Centers and various Outreach Clinics. Direct support to following Organizations (ST Paul Mobile Clinic, GONESHA, Naulo Ghumti, Tolsudhar SAmiti, Indreni Akikrit Bikas Kendra Pokhara)
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Financial assistants for poor patients:</strong></td>
<td>Poor Patient Fund (PPF) has been established through which concessions and discounts is provided.</td>
</tr>
</tbody>
</table>

| Other Available Facilities | - Separate/dedicated Billing Counter for Emergency patients during working hours  
- ATM at the main entrance  
- Coffee Shop/restaurant open for 24- hours  
- Round-the-clock power back-up and ambulance on call  
- Mortuary for transient storage of dead-bodies  
- Helipad for the air-ambulances |

Source: MCOMS Self Appraisal Report, 2018

### 2.3.1 LAND AND INFRASTRUCTURE

**Land**

Total 233 ropani, 12 anna, 5 paisa and 1 dam (233-12-5-1) land is available in phulbari, ward no 11 and 67 ropani, 3 anna and 3(67-3-0-3) dam is available in Deep, Ward no.16 of Pokhara Metropolitan for the project. The land area details of the project are shown in the table below.

#### Table 2: Total Land Area

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Total Area</th>
<th>Type</th>
<th>Occupied by</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>At Phulbari, Pokhara-11</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>193-7-3-1 Ropani</td>
<td>Taken for lease for 49 years</td>
<td>Hospital Area, Hostel and Housing</td>
</tr>
<tr>
<td>2.</td>
<td>40-5-2 Ropani</td>
<td>Full ownership of MEMG Nepal</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>233-12-5-1 Ropani</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hospital Covered Area:</strong></td>
<td>19700 sq.m.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>At Deep, Pokhara-16</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>67-3-0-3 Ropani</td>
<td>Basic Science, MCOMS</td>
<td>Taken on lease for 49 years</td>
</tr>
</tbody>
</table>

Source: MCOMS Self Appraisal Report, 2018

#### Table 3: Floor Area of Main Building (Hospital)

<table>
<thead>
<tr>
<th>Floor</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basement Floor Area</td>
<td>7638.355 sq.m.</td>
</tr>
<tr>
<td>Ground Floor Area</td>
<td>7346.355 sq.m.</td>
</tr>
<tr>
<td>1st Floor Area</td>
<td>6668.978 sq.m.</td>
</tr>
<tr>
<td>2nd Floor Area</td>
<td>6668.978 sq.m.</td>
</tr>
<tr>
<td>3rd Floor Area</td>
<td>6126.878 sq.m.</td>
</tr>
<tr>
<td>4th Floor Area</td>
<td>6126.878 sq.m.</td>
</tr>
<tr>
<td>5th Floor Area</td>
<td>6126.878 sq.m.</td>
</tr>
<tr>
<td>Parking Area</td>
<td>735.500 sq.m.</td>
</tr>
</tbody>
</table>
Environmental Impact Assessment of
Manipal College of Medical Sciences

### Open Space Area
92500.00 sq.mt.

### Garden Area
1115.35 sq.mt.

### Waste Management Area
3344.55 sq.mt.

### Space for Future Expansion
Adequate space is available

*Source: MCOMS Self Appraisal Report, 2018*

**Land for Hostel:** Two of the hostels: girls and boys’ hostel are available for the MBBS students which are owned by MCoMS.

Space for future expansion: Available

**Infrastructure**

The other building apart from hospital and hostel with their dimension, built-up area and year of construction is shown in the table below.

<table>
<thead>
<tr>
<th>S. N</th>
<th>Description of buildings</th>
<th>Length &amp; Width (ft)</th>
<th>Built up Area (sq. ft)</th>
<th>Year of construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Admin Block</td>
<td>50 50</td>
<td>2500</td>
<td>1980</td>
</tr>
<tr>
<td>2</td>
<td>Account Building</td>
<td>16 60</td>
<td>960</td>
<td>1980</td>
</tr>
<tr>
<td>3</td>
<td>Sanjeevani Clinic Building</td>
<td>13.5 23.5</td>
<td>317.25</td>
<td>1980</td>
</tr>
<tr>
<td>4</td>
<td>Lecture Hall - 1,2 and Anatomy Lab</td>
<td>45 135</td>
<td>6075</td>
<td>1994</td>
</tr>
<tr>
<td>5</td>
<td>Lecture Hall – 3&amp;4</td>
<td>32 112</td>
<td>3584</td>
<td>2003</td>
</tr>
<tr>
<td>6</td>
<td>Microbiology Musuem</td>
<td>13 20</td>
<td>260</td>
<td>1994</td>
</tr>
<tr>
<td>7</td>
<td>Anatomy Dissection &amp; Museum Halls</td>
<td>32 137</td>
<td>4384</td>
<td>1994</td>
</tr>
<tr>
<td>8</td>
<td>Pathology Museum</td>
<td>27 33</td>
<td>891</td>
<td>1994</td>
</tr>
<tr>
<td>9</td>
<td>Anatomy Department</td>
<td>29 65</td>
<td>1885</td>
<td>1994</td>
</tr>
<tr>
<td>10</td>
<td>Biochemistry and Pathology Departments</td>
<td>29 65</td>
<td>1885</td>
<td>1994</td>
</tr>
<tr>
<td>11</td>
<td>Microbiology and Community Medicine Departments</td>
<td>29 65</td>
<td>1885</td>
<td>1994</td>
</tr>
<tr>
<td>12</td>
<td>Physiology Department</td>
<td>29 65</td>
<td>1885</td>
<td>1994</td>
</tr>
<tr>
<td>13</td>
<td>Pharmacology Departments</td>
<td>29 65</td>
<td>1885</td>
<td>1994</td>
</tr>
<tr>
<td>14</td>
<td>Pathology Lab</td>
<td>23 60</td>
<td>1380</td>
<td>1994</td>
</tr>
<tr>
<td>15</td>
<td>Microbiology Lab &amp; Physiology Lab</td>
<td>29 90</td>
<td>2610</td>
<td>1994</td>
</tr>
<tr>
<td>16</td>
<td>Biochemistry Lab</td>
<td>22 60</td>
<td>1320</td>
<td>1994</td>
</tr>
<tr>
<td>17</td>
<td>Biochemistry Store, Pharmacology Lab and Physiology</td>
<td>29 90</td>
<td>2610</td>
<td>1994</td>
</tr>
</tbody>
</table>
Table 1: Description of buildings

<table>
<thead>
<tr>
<th>S. N</th>
<th>Description of buildings</th>
<th>Length &amp; Width (ft)</th>
<th>Built up Area (sq. ft)</th>
<th>Year of construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>Community, Medicine Museum and Skill Lab</td>
<td>29 65</td>
<td>1885</td>
<td>1994</td>
</tr>
<tr>
<td>19</td>
<td>Library</td>
<td>29 75</td>
<td>2175</td>
<td>1994</td>
</tr>
<tr>
<td>20</td>
<td>Reading Hall</td>
<td>23 105</td>
<td>2415</td>
<td>2003</td>
</tr>
<tr>
<td>21</td>
<td>Kitchen and Dining Hall</td>
<td>33 120</td>
<td>3960</td>
<td>1994</td>
</tr>
<tr>
<td>22</td>
<td>Second Dining Hall</td>
<td>41 78</td>
<td>3198</td>
<td>2003</td>
</tr>
<tr>
<td>23</td>
<td>Sunkoshi Hostel</td>
<td>39 130</td>
<td>5070</td>
<td>1994</td>
</tr>
<tr>
<td>24</td>
<td>Karnali Hostel</td>
<td>32 120</td>
<td>3840</td>
<td>1980</td>
</tr>
<tr>
<td>25</td>
<td>Trishuli Hostel</td>
<td>33 133</td>
<td>4389</td>
<td>2005</td>
</tr>
<tr>
<td>26</td>
<td>Nuptse Hostel</td>
<td>35 190</td>
<td>6650</td>
<td>2005</td>
</tr>
<tr>
<td>27</td>
<td>Faculty Quarters – 1</td>
<td>33 42</td>
<td>1386</td>
<td>1980</td>
</tr>
<tr>
<td>28</td>
<td>Faculty Quarters – 2</td>
<td>26 29</td>
<td>754</td>
<td>1980</td>
</tr>
<tr>
<td>29</td>
<td>Gopal Store</td>
<td>25 33</td>
<td>825</td>
<td>1980</td>
</tr>
<tr>
<td>30</td>
<td>Sub Store</td>
<td>25 30</td>
<td>750</td>
<td>1994</td>
</tr>
<tr>
<td>31</td>
<td>Generator Room</td>
<td>35 22</td>
<td>770</td>
<td>1994</td>
</tr>
<tr>
<td>32</td>
<td>Guard Room</td>
<td>14 14</td>
<td>196</td>
<td>1994</td>
</tr>
<tr>
<td>33</td>
<td>Union Building</td>
<td>14 32</td>
<td>448</td>
<td>1994</td>
</tr>
</tbody>
</table>

Source: MCOMS Self Appraisal Report, 2018

2.3.2 FACILITIES/SERVICES

MCoMS houses the academic buildings, library, female student and male student hostels and Teaching Hospital. The college has the educational program of MBBS, PG – (MD/MSc/MS), DM-Cardiology and Nursing (B.Sc./PCL) programs affiliated with Kathmandu University. It was the first private medical college institution established in Nepal. MCOMS provides various facilities with the operation of the different departments giving facilities for the Inpatients and Outpatients with total 750 beds.

a) Academic Contribution

Since 1994, MCOMS has been contributing in the academic field to produce qualified doctors and nurses in the country. Till now, MCOMS has produced 1,045 Nepalese students have completed MBBS and are now serving in different parts of the country. Further to this, the 750-beded Manipal College of Medical Sciences (MCOMS) commenced in 1998 and postgraduate, nursing and allied health programs were started in the year 2000. The details of MCOMS contribution in academic sector is tabulated below.

Table 5: Graduates of MCOMS till date from different course

<table>
<thead>
<tr>
<th>COURSE</th>
<th>GRADUATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBBS</td>
<td>2253</td>
</tr>
<tr>
<td></td>
<td>(Paid Nepalese: 596; Nepalese on 100% scholarship: 449; Foreign Nationals: 1208)</td>
</tr>
<tr>
<td>PG – (MD/MSc/MS)</td>
<td>196</td>
</tr>
</tbody>
</table>
Table 6: Students intake in MCOMS in different course

<table>
<thead>
<tr>
<th>COURSE</th>
<th>STUDENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBBS</td>
<td>546 (Paid Nepalese: 106; Nepalese on 100% scholarship: 161; Foreign Nationals: 279)</td>
</tr>
<tr>
<td>PG – (MD/MSc/MS)</td>
<td>82</td>
</tr>
<tr>
<td>DM- Cardiology</td>
<td>01</td>
</tr>
<tr>
<td>Nursing (B.Sc./PCL)</td>
<td>Bsc-80, PCL -117</td>
</tr>
</tbody>
</table>

Source: MCOMS Self Appraisal Report, 2018

b) Subspeciality Services

Being the largest hospital in the western region, MCOMS provides special facilities such as:

- **Cardiology**: Facilitated with noninvasive cardiac Lab with Echocardiography, TMT, Holter and ABP. Four bedded CCU with monitoring facilities. DM (Post-Doc in Cardiology) began in Feb 2013. Cardiac catheterization laboratory for invasive procedures has been installed in 2015.

- **Neurosurgery**: Facilities for elective and emergency neurosurgery. The department consist of an OT dedicated for neurosurgery and eight bedded Neurosurgical ICU with ventilator and monitoring facilities.

- **Gastroenterology and Hepatology**: Diagnostic and treatment facilities with intensive care. Routine Diagnostic and therapeutic endoscopy services.

- **Medical Oncology**: Radiotherapy, Cobalt 60 and Linear particle accelerator LINAC (the only radio-therapeutic installation in Western Nepal)

- **Oral and Maxillofacial Surgery**

- **Plastic and Reconstructive Surgery**

- **Onco Surgery**

- **Nephrology**: Eight hemodialysis machines for routine and emergency dialysis.

- **Cardiothoracic surgery**: CTVS unit is run by 1 CTVS Surgeon. Thoracic surgeries without CP by-pass are being done routinely, CP By-pass installation is proposed.

c) Critical care
• Medical ICU: 12 beds
• Surgical ICU (post-op): 8 beds
• Neuro Surgical ICU: 8 beds
• Cardiac Care Unit: 4 beds
• Pediatric ICU: 8 beds
• Neonatal ICU: 16 beds

All 50 ICU beds have central oxygen supply, cardiac monitors, central Arterial Blood gas analysis with mechanical ventilators. NICU has incubators, photo therapy, CPAP and ventilators.

Telemedicine Department of Internal Medicine, MCoMS in collaboration with University of Illinois, Chicago with technical support of Binaytara foundation runs a weekly Telemedicine session. MCOMS is the first institute in the country to have a program of such kind. Telemedicine is part of a Medicine Resident's academic activity.

To fulfill water supply needs sundarijal water supply line has been connected. There is canteen facility for students, and euroguard has been installed for drinking water. There is availability of national grid line for power supply and in case of loadshedding there is facility of power supply through inverter.

![Figure 2: Hostel Canteen](image)

e) Canteen facility:
There is canteen facility catering to hospital staffs, patients, visitors and medical college students. There is use of Aqua jars water provided for drinking purposes. In total, around 100-110 kg of organic waste is generated per day and 6-10 kg of inorganic waste. For hygiene purpose they use caps and gloves.
2.3.3 OCCUPANCY IN HOSPITAL
The average occupancy of OPD (Out Patient Department) is 1000 patients per day and average occupancy of IPD (In Patient Department) is 400 per day in F.Y 073-074. Average bed occupancy is observed 48% out of 750 beds available. (Self-Appraisal Report, MCOMS, 2018).

2.3.4 GREENERY AND OPEN SPACE
MCOMS complex is spread over land measuring more than 300 rpanies. Out of this, more than 2/3 area is left as greenery coverage. Greenery has been developed for the aesthetic beauty as well as for the landscaping. There is open space for parking and also nearby parking area greenery is maintained with trees along the fences of the building.

2.3.5 WATER SUPPLY
Depending on the bed occupancy the hospital the total water demand of hospital, hostel and academics are mentioned in the table below.

Table 7: Water Consumption per day

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Liters per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaning</td>
<td>3-4 lakhs</td>
</tr>
<tr>
<td>Per capita from staff</td>
<td>50-60</td>
</tr>
<tr>
<td>Gardening</td>
<td>2-3 lakhs</td>
</tr>
<tr>
<td>Others (Cooking, Washing etc.)</td>
<td>5-6 lakhs</td>
</tr>
</tbody>
</table>

Source: MCOMS Self Appraisal Report, 2018

So, the water demand of MCOMS is around 12-13 lakhs litre per day. Need of water demand in hospital and hostel is fulfilled by Drinking Water Supply Corporation.
(Khanepani Sansthan), Pokhara. Besides this, MCOMS have four deep borings within the hospital premises. The water from the deep bores are periodically tested as they are used for the drinking purposes. The test report shows that there are no significant amount of harmful chemicals such as Ammonia, iron etc. The test report is attached in the Annex H of this EIA report. For purifying the water, bleaching powder is used as disinfectant and also Euro Guards are fitted at each floor of the hospitals. The water supply system within the hospital is operated and monitored by four trained plumbers who are on permanent roster of the Institution. Rain Water is also harvested in nearby the deep boring sites.

![Figure 4: Water Purification by Euro Guard installed at each floor of the hospital](image)

### 2.3.6 SANITARY WORKS

For the sanitary works there is combined sewer system. Grey water are the waters that are generated from the laundary, washbasins and other cleaning works whereas the black water is water that is generated from the toilets which has fecal contamination. The waste water that is generated from O.T, laboratory and Gyno wards which have harmful chemicals and contaminants are discharged into a separate soakpit within the hospital premises. Waste water in the soakpit is treated with chlorine and bleaching powder once in 2-3 days. Other waste water ie, Grey waste water generated from all other wards like; from laundry, wash basins, cleaning works and runoff water are piped outside of hospital using sewer line which is first treated through ETP and then discharged to the river meeting the effluent standards. The test reports of the effluent from the treatment plant is attached in the annex H of the report.

Several solid wastes are generated from the hospital and other buildings such as plastic bottles, bags, containers, packing materials, syringe and many more. The produced hospital and Non-hospital wastes are 80-85 Kgs and 120-130 Kgs per day respectively. The infectious waste generated is 5-6 kg/ward.
2.3.7 WASTE MANAGEMENT

a) Health Care Waste Management
Health care waste management system was initiated under leadership of Dr. A.L Sharma, (professor of Community Medicine). Total hospital HCWM was outsourced to a private organization, Waste Service Pvt. Ltd. They carried out health care waste assessment, conducted induction trainings to all the staffs and started HCWM piloting in different wards of the hospital.

Color indicated buckets are kept in easily accessible location of different wards and departments of the hospital. Orientation on the waste management especially on segregation of waste has been provided to nurses, doctors and housekeepers. Hospital staffs of each ward themselves segregate waste generated at source using different colored buckets.

There is separate HCWM Advisory Committee and HCWM Implementation commitee has also been formed.
Green, Blue and Yellow color buckets are kept at the easily accessible/reachable location of patients whereas the Red kept at the nursing station of different wards. A needle cutter is also kept which are accessible only by the nurses and doctors. All the segregated waste from each ward is brought to the separate waste collection unit. Waste collection is a separate building which consists of different chambers for storage of segregated waste and further segregation of waste is done.

Different kinds of waste such as risk, non-risk waste such as pathological waste, anatomical waste, biodegradable waste, plastic and papers, which are collected from different wards after the onsite segregation process in wards itself using different colored buckets, are transferred daily to the waste collection area and then stored separately. Risk waste which are infectious that are collected from the red buckets such as syringe, gloves etc are autoclaved and after autoclaving. For sharp tools such as syringe needles are separated from syringe from the needle cutter. Needle cutters are attached in each ward. Cut needles are collected separately and transferred to waste management area and are disposed in the pit. Anatomical waste collected from the Red bucket such as blood, amputated body parts are stored separately and then transferred to a pit for disposal inside hospital premises.

Other waste such as plastics and papers are also collected and stored and the wastes are sent to the landfill sites as per the contract agreement with Waste Services Pvt. Ltd.

<table>
<thead>
<tr>
<th>Waste Category</th>
<th>(% of Waste Category)</th>
<th>Total Waste according to Waste Category (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Waste</td>
<td>74.88</td>
<td>592.48</td>
</tr>
<tr>
<td>Infectious Waste</td>
<td>21.80</td>
<td>172.49</td>
</tr>
<tr>
<td>Sharp Waste</td>
<td>2.85</td>
<td>22.55</td>
</tr>
<tr>
<td>Discarded Medicine and Cytotoxic Drugs</td>
<td>0.46</td>
<td>3.64</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>791.25</td>
</tr>
</tbody>
</table>

*Source: Waste quantification survey, 2018*

**b) General Waste Management:**

General waste of MCOMS comprises of waste that are non-infectious. It includes the waste generated from canteen. There are canteens catering for hospital, college and hostel staffs and students. General waste comprises of both organic and inorganic waste. Type of organic waste generated are especially food waste, cardboards, napkins etc and inorganic waste includes especially plastic of noodles, plastic bag, plastic bottles glasses etc. Total organic waste generated are around 110-120 kg/day and inorganic waste are around 6-8 kg/day. Organic waste from canteen is taken for pig feed by locals and inorganics to the waste management area of the hospital and to landfill sites.
2.3.7 LAUNDARY MANAGEMENT

The MCOMS have a separate building for laundry unit under the house keeping section. There are total of 5 staffs in the laundry management. In this laundry unit there is 50 Kg capacity 2 washing machine and 1 dryer. Clothes ie; aprons, bedsheets, etc are cleaned everyday. There are different types of clothe item that come from different departments such as OT, Gyno, General etc which are treated separately. Clothes with blood stains and highly infectious clothes are treated with Virex chemical and then washed separately. Whereas the other patient’s clothes are just simply washed with normal liquid and powder detergents. There are no disinfectants used to treat clothes patients. In the work station for safety purposes laundary staffs wear mask, gloves and boots. There is a separate water supply system for the laundry purpose. Waste water from the launderary is directly connected to sewer without any treatment.
2.3.8 FIRE MAIN
Fire alarm and fire hydrant system are installed in the main hospital as well as the college building. For emergency fire there is direct connection of water reserve overhead water tank for firefighting system. Fire extinguishers are also installed in each floor.

2.3.9 POWER SUPPLY AND BACKUP SYSTEM
For the electrical power supply, direct 11 KVA line from NEA has been taken by MCOMS by constructing 4.5 km long transmission line. So, there is no problem of Loadshedding. To Avoid the voltage fluctuations a Servo Voltage Stabilizer with matching capacity has also been installed.
For the backup purpose two diesel generators, one of 600 KVA and another of 320 KVA have been installed and to maintain continuous power supply as an alternative source of electrical power there is back-up system that operates within 10 seconds of any interruption in the electricity. As hospital uses advanced clinical and diagnostic equipments which are voltage sensitive computers which demand free from momentary interruptions, transient sags and surges and blackouts, separate uninterrupted power supply (UPS) has been provided to those equipments.

![Image of generators](image)

**Figure 10: generator, 600 & 320 KVA**

### 2.3.10 MEDICAL EQUIPMENT FOR DIAGNOSTIC PURPOSE

Hospital has the medical equipments for the diagnostic purpose. In the Radiology department 2 X-Ray machines with CR system, 5 functional protable x-ray machines, 3 USG machine with Doppler and 3 portable USG machines available. MCOMS has started using Laser beam technology for producing X-Ray report which are easily disposable and harmless in compare to previous reports. There is TLD (thermoluminescent Dosimeter) for measuring the amount of radiation exposed. Lead apron and Lead jackets are also used for the safety purposes while working with X-rays. Also 1 CT scan and 1 MRI machines are available.
2.3.11 MAINTENANCE SECTION
A well-equipped maintenance section is providing the 24-hr services with trained and technical team of human resource. It includes plumber, electrical, workers in waste management and the administration itself.
2.3.11 CSR ACTIVITIES

a) Social Service
Social Service (SS) is aimed at providing support to the underprivileged citizens of Nepal. Social Service Section (SSS) of MCOMS, liaises between the individual donors, philanthropists, organizations, institutions who / which make generous donations in cash or kind and through such funds collected, provides support with cash or kind thus received, to patients admitted through SSS in Teaching Hospital and in different parts of Nepal.

- MCOMS has run several camps and health out posts (Daily and Weekly)
- There is 10% bed free for the poor patients as well as hospital provides free beds, free food and necessary investigation to the poor patients and also provides discounts on surgeries if necessary for the poor patients.
- For the local people there is 15% discount in the medical services and also 50% discount is available for senior citizens.

b) Others CSR activities:
MCOMS also contributes to community development by providing funds to local clubs or committee every year. It has been supporting local community in local development by providing contribution in funds for roads, drainage, temples etc.

2.3.12 SAFETY MEASURES
As an infection control program there is a Hospital Acquired Surveillance Committee (HIASC) has been formed under the chairmanship of Hospital Director. As a process of the infection control fumigating is done in every 3 months, Swab culture is done in every month, daily cleaning is performed using cholrine tablets and autoclaving is done. For occupation health and safety measures gloves, masks are used in each ward to prevent contact with disease.

2.4 HUMAN RESOURCES
There are total 605 staffs in the hospital and college. Details of the staffs are as follows:

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Field of Expertise</th>
<th>Full Time</th>
<th>Part Time</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hospital Superintendent</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Asst. Hospital Superintendent</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Physician</td>
<td>10</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>4</td>
<td>Surgeon</td>
<td>10</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>5</td>
<td>Anesthesics</td>
<td>7</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>Radiologists</td>
<td>5</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>7</td>
<td>Pathologists</td>
<td>7</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>8</td>
<td>Microbiologists</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>Biochemist</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>Pediatrician</td>
<td>6</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>11</td>
<td>Orthopedics</td>
<td>8</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>12</td>
<td>Gynecologists</td>
<td>8</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>13</td>
<td>Dermatologists</td>
<td>5</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>14</td>
<td>Cardiologists</td>
<td>3</td>
<td>2</td>
<td>5</td>
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<td>15</td>
<td>Nephrologists</td>
<td>3</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>16</td>
<td>Psychiatry</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>17</td>
<td>Other Consultant Doctors</td>
<td>5</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>18</td>
<td>Emergency Physician</td>
<td>5</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>19</td>
<td>Medical Officer</td>
<td>20</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>20</td>
<td>Emergency Paramedics</td>
<td>5</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>21</td>
<td>Lab Technologists</td>
<td>15</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>22</td>
<td>Lab Technician</td>
<td>20</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>23</td>
<td>Radiotherapy Technologists</td>
<td>4</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>24</td>
<td>Radiotherapy Technician</td>
<td>5</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>25</td>
<td>Medical Physicists</td>
<td>6</td>
<td></td>
<td>6</td>
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<td>26</td>
<td>Radiography office</td>
<td>5</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>27</td>
<td>Radiographer</td>
<td>10</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>28</td>
<td>Physiotherapists</td>
<td>10</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>29</td>
<td>Ophthalmologists</td>
<td>4</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>30</td>
<td>Food and Nutritionists</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>31</td>
<td>Pharmacist</td>
<td>10</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>32</td>
<td>Cytotechnician</td>
<td>3</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>33</td>
<td>ECG Technician</td>
<td>4</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>34</td>
<td>Echo Technician</td>
<td>4</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>35</td>
<td>O.T Assistant</td>
<td>10</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>36</td>
<td>Medical Record officer</td>
<td>4</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>37</td>
<td>Matron</td>
<td>2</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>38</td>
<td>Assistant Matron</td>
<td>6</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>39</td>
<td>Nursing officer</td>
<td>25</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>40</td>
<td>Staff Nurse</td>
<td>150</td>
<td></td>
<td>150</td>
</tr>
<tr>
<td>41</td>
<td>Electrician</td>
<td>4</td>
<td></td>
<td>44</td>
</tr>
<tr>
<td>42</td>
<td>Lift Operator</td>
<td>8</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>43</td>
<td>Plumber</td>
<td>4</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>45</td>
<td>Hospital Administrator</td>
<td>4</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>46</td>
<td>Account officer</td>
<td>8</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>47</td>
<td>Receptionist</td>
<td>10</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>48</td>
<td>Storekeeper</td>
<td>6</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>49</td>
<td>Helper/cleaner</td>
<td>50</td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>50</td>
<td>Security guard</td>
<td>20</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>51</td>
<td>Driver</td>
<td>8</td>
<td></td>
<td>80</td>
</tr>
<tr>
<td>52</td>
<td>Gardener</td>
<td>6</td>
<td></td>
<td>60</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>546</td>
<td>59</td>
<td>605</td>
</tr>
</tbody>
</table>

Source: Appraisal report MCOMS, 2017
CHAPTER 3: EXISTING ENVIRONMENTAL CONDITION

This chapter summarizes the environmental conditions of the project area and the information is based on the previous studies and the recent site visit on 28th Jestha to Asar 5, 2075B.S. The project will be implemented in Phulbari and Deep, ward no. 11 and 16 of Pokhara Metropolitan, Kaski district. Physical, biological, socio-economic and cultural environment of the project area has been described below separately.

3.1 PHYSICAL ENVIRONMENT

The existing environmental conditions of the proposed Project area with regard to physical, biological and socio-economic and cultural environment are presented in following sub-chapters;

Topography

Topographically, Kaski district has an area of about 2,017 km² out of which Pokhara Metropolitan city covers an area of 450.74 km² (MOFAGA website). The Project area lies in ward no. 11 of Pokhara Metropolitan city which covers an area of (6.97 km²) and ward no. 16, which covers area of 34.68 km². Pokhara valley lies in tectonic valley between main Himalayan range and Mahabharat range and constitute of gravelly surface slanting from northwest to southeast (Upreti, 1999). Geographically College site is located at 28°14'9.05" N Latitude and 83°59'50.15"E Longitude. The altitude variation of the hospital site is 910 above mean sea level.

Land Use

Because of the overall infrastructure facilities and the rapid population growth, the land use pattern of city is changing year to year.

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Land Use Types</th>
<th>Km²</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Urban/Builtup</td>
<td>28.44</td>
<td>51.42</td>
</tr>
<tr>
<td>2</td>
<td>Water body</td>
<td>7.02</td>
<td>12.49</td>
</tr>
<tr>
<td>3</td>
<td>Open field</td>
<td>4.26</td>
<td>7.70</td>
</tr>
<tr>
<td>4</td>
<td>Forest Cover</td>
<td>1.22</td>
<td>2.21</td>
</tr>
<tr>
<td>5</td>
<td>Cultivated Land</td>
<td>11.21</td>
<td>20.27</td>
</tr>
<tr>
<td>6</td>
<td>Sandy Area</td>
<td>3.16</td>
<td>5.71</td>
</tr>
<tr>
<td>7</td>
<td>Total</td>
<td>55.31</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Pokhara Metropolitan, 2013

Hospital site is located at the semi urban area of Municipality ward No. 11 of Pokhara city. The hospital surrounding sites occupied by residential areas, agricultural land and Seti River.

Climate and Hydrology

As per climatic division, Pokhara falls under the microthermal climatic zone. The valley has humid-temperature to alpine conditions in elevated parts and humid-subtropical in the
lower valleys (Pokhara Metropolitan, 2013). The Himalayan ranges have a direct effect on precipitation and temperature conditions. Humid air streams coming from the south or Bay of Bengal are trapped in this area and are forced to rise and condense to shed most of their moisture, which makes the valley a rainiest place of the Nepal. The abruptly rising 7000-8000-meter, high Mt. Dhaulagiri ranges in a short distance play an important orographic lifting of moist air over this area. The Mt. Annapurna ranges is at a distance of 40-50 km in the north, Mt. Dhaulagiri range is at 50-60 km in the north-west and the Mt. Manaslu and Lamjung Himal is at 40-50 km in the north-east surrounded by on its three sides act as the three sides of a room. In monsoon season (June-September) it receives 80 percent of the total rainfall of the year. The average temperature in Pokhara Metropolitan city ranges from 31°C to 6°C with an average rainfall of 3880mm. river seti with deep gorges and its tributaries are prominent drainage in pokhara.

**Air Quality**

Emissions inventory, which determines the contribution of different sources of air pollution, is not routinely conducted in Nepal or in major urban areas. Inventory of emissions are conducted on a project basis. In Pokhara Metropolitan city detailed inventory of air pollution has nevr been done, however one research was conducted by IUCN (2004) to obtain 8-hour average concentrations of pollutants for a particular day in each site.

**Table 11: Air Quality Data of Pokhara City**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Value (48 hr. data)</th>
<th>National Ambient Air Quality Standard of Nepal, 2003</th>
<th>Ambient Air Quality Standard of WHO</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM$_{2.5}$</td>
<td>ug/m$^3$</td>
<td>90-178</td>
<td>125</td>
<td>70</td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>ug/m$^3$</td>
<td>37-88</td>
<td>120</td>
<td>70</td>
</tr>
</tbody>
</table>

(Source: [http://aqicn.org](http://aqicn.org), Dec 19, 2019)

The hospital site is not noisy as it is at the edge of populated area. The air quality observed was at natural state and hospital site does not have any sources of noise nuisance except vehicular horns. The average sound pressure level (SPL) in hospital area at day time at distance 25m from road has shown 49Dba. So vehicular movement only considered as major source of air and noise pollution in the project area.

**Water Quality**

The water for hospital purposes is used from Municipal pipeline as well as extraction from deep boring (from 200 feet). For the purification of water, water filter, treated water with reverse osmosis process and purified water is distributed in whole the hospital compound. Water availability is year around and its quality has been maintained.

The water quality of the nearby Seti river from the college is shown in the table below.

**Table 12: Analysis of water samples from four points of Seti River at Pokhara**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>PH</th>
<th>DO</th>
<th>BOD</th>
<th>COD</th>
<th>TDS</th>
<th>E-coli</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desired Value</td>
<td>6.5-8.5</td>
<td>&gt;5</td>
<td>&lt;30</td>
<td>&lt;250</td>
<td>&lt;1000</td>
<td>0</td>
</tr>
</tbody>
</table>
### Geology

There are all together 13 geological formations found in Pokhara Metropolitan city, namely Active alluvial fan, Begnas formation, Colluvium formation, Gahachowk formation, Kunchha formation, Lacustrine Deposits, Lakes, Non-active alluvial fan, Pokhara formation, recent deposits, soil colluviums, soil residual and Tallakaot formation. The project site and its surroundings areas lie in Gahachowk formation. Gahachowk formation is mainly a debris flow deposit and is characterized by grey to pale greenish grey with main constitution of limestone fragments of boulder to silt size. Thickness varies up to 100m. in the central part highly calcareous cemented conglomerate is found. It has widely developed krast structures in the form of sink holes, caverns and sub-soil pinnacles. These soil characteristics indicates low to moderate bearing capacity and high liquefaction potential in case of mega earthquake (UNDP/ERRRP, 2009)

### Existing Road and Traffic Situation

The project site is assessed with black topped roads without any disturbances. Sufficient parking spaces have been visualized. Helipad is available for air ambulances. Since, the hospital is located a bit far from the city area, no heavy traffic volumes are found.

---

<table>
<thead>
<tr>
<th>Unit</th>
<th>mg/l</th>
<th>mg/l</th>
<th>mg/l</th>
<th>mg/l</th>
<th>MPN/100ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seti-Mardi</td>
<td>7.4</td>
<td>8.1</td>
<td>1.2</td>
<td>2.4</td>
<td>110</td>
</tr>
<tr>
<td>Seti-Setidoban</td>
<td>7.5</td>
<td>9.4</td>
<td>1.5</td>
<td>3.3</td>
<td>170</td>
</tr>
<tr>
<td>Seti-PN college</td>
<td>7.5</td>
<td>14.5</td>
<td>1.2</td>
<td>2.5</td>
<td>160</td>
</tr>
<tr>
<td>Seti-Dobila</td>
<td>7.6</td>
<td>8.7</td>
<td>1.3</td>
<td>2.6</td>
<td>150</td>
</tr>
</tbody>
</table>

(Source: DHM, opendatanepal.com, 2018)

**Figure 13: Parking facilities**
3.2 BIOLOGICAL ENVIRONMENT

Small patches of forest areas lie in north direction approximately 500m ahead and outside the compound of Manipal College teaching hospital. There are no environmental sensitive areas such as National Parks, Wildlife Reserves and conservation area.

Vegetation

The college site does not contain any endemic or endangered floral species in its territory; however, many tree species have been planted all around hospital premises. During the field visit and interaction with the gardeners, data on biological environment was collected. There are several exotic plants in and around the project area specially planted for decoration purposes which are Crismas trees (*Araucaria columnaris*) and Ashoka tree (*Saraca asoca*). The main vegetation found near the project areas are mostly the Bamboo (*Dendrocalamus strictus*), Sal (*Shorea robusta*), Chilaune (*Schima wallichillii*), Katus (*Castanopsis indica*), Ketuki (*Pandanus nepalensis*), Khirro (*Sapium insigne*), Mango (*Mangifera indica*) and Lime (*Citrus aurantifolia*). Similarly, the other vegetations found are Camp (*Mangolia campbelfi*), Salla (*Pinus roxburjii*), Painyu (*Prunus cerasoides*), Uttis (*Alnus nepalensis*), Amala (*Phyllanthus emblica*), Kapur (*Cinnamomum camphora*), Dalchini (*Cinnamomum zeeyanicum Breyn*), Sisau (*Dalbergia sisso*), Dhupi (*Juniperus indica*), Simal (*Bombax ceiba*), Bar (*Ficus benghalensis*), Pipal (*Ficux religioso*), Haledo (*Curuma angustifolia*), Lemon Grass (*Cymbopogon*), Unyu (*Dryopteris filix-mas*), Lapsi (*Pterygota alata*), Koiralo (*Bauhinia variegate*), Banana (*Musa paradisiaca*), Guava (*Psidium guajava*), Orange (*Citrus reticulata*), Avacado (*Persea Americana*), Kimbu (*Morus nigra*).


Others medicinal herbs such as kurilo (*Asparagus racemosus*), Ghii kumari (*Aloevera*), pudina (*Mentha spicata*) are also found within the college premise.
Terrestrial Fauna
There are no any protected wildlife species noticed in hospital site and its vicinity. However, according to the local people wild animals like Leopard (Panthera pardus), Nyauri Muso (Herpestes edwardsii), Syaal (Canis aurieus), Musa (Rattus tanezumi), Monkey (Macaca Fasicularis), Reptiles like Common Krait (Bungarus caeruleus), Bagale Snake (Amphiesma stolatum), Oriental Garden Lizard (Calotes versicolor), Bronze Mabuya (Eutropis macularia), Amphibians like Frog (Rana taipehensis) and Indian burrowing frog (Sphaerotheca breviceps) and Invertebrates like Snail (Cornu aspersum) are occasionally observed in the surrounding environment.

Birds
The dominant bird species observed around the project area are Sparow (Passer domesticus), Crow (Corvus splendens), Danger (Acridotherres sp.), Pigeon (Columba leuconota), Dhukur (Streptopelia chinensis), Chibe (Dicrurus aeneus), Koili (Eudynamys scolopaceus), Parrot (Psittaciformes), Kalij (Lophura leucomelanos), Dhobini chara (Copsychus saularis), Vulture (Aegypius Monachus), Dhangre (Acridotheres tristis).

3.3 SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT

Demography Characteristics
According to National Population Census 2011, the total Population of Pokhara Metropolitan city is 402,995 (Female: 210,018 Male: 192,977) with 105,630 households. The population of the Phulbari, Ward-11 and Deep, Ward-16 of Pokhara metropolitan city is mentioned in table below.

Table 13: Demographic Profile of affected Ward

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Ward no.</th>
<th>Household</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
</tr>
<tr>
<td>1.</td>
<td>Phulbari, Ward-11</td>
<td>4,023</td>
<td>14,716</td>
</tr>
<tr>
<td>2.</td>
<td>Deep, Ward -16</td>
<td>5,462</td>
<td>20,278</td>
</tr>
</tbody>
</table>

(Source: CBS, 2011)
Caste and Religion
According to Metropolitan Profile, the major ethnic groups in the project areas are Brahman, Chettri, Gurung, Newar, Magar and Pun. 75% of the populations are Hindus, followed by Buddhist, Islam and Christian.

The ethnic distribution of the population of Pokhara Metropolitan is shown in the table below:

Table 14: Population by Ethnicity of Pokhara Metropolitan

<table>
<thead>
<tr>
<th>Caste</th>
<th>Population by ethnicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chhetri</td>
<td>48,830</td>
</tr>
<tr>
<td>Brahmin</td>
<td>89,734</td>
</tr>
<tr>
<td>Magar</td>
<td>31,877</td>
</tr>
<tr>
<td>Tharu</td>
<td>2,311</td>
</tr>
<tr>
<td>Tamang</td>
<td>9,924</td>
</tr>
<tr>
<td>Newar</td>
<td>20,442</td>
</tr>
<tr>
<td>Musalman</td>
<td>3,707</td>
</tr>
<tr>
<td>Bishwokarma</td>
<td>20,550</td>
</tr>
<tr>
<td>Rai</td>
<td>2,926</td>
</tr>
<tr>
<td>Gurung</td>
<td>60,068</td>
</tr>
<tr>
<td>Dholi</td>
<td>10,415</td>
</tr>
<tr>
<td>Sarki</td>
<td>5,937</td>
</tr>
</tbody>
</table>

(Source: CBS, 2011)

Occupation
The occupational structure of the Pokhara Metropolitan city indicates agriculture as dominant sector, but service sector has played an important role in the economic progress of Pokhara city. People are also involved in export and import business and many others services-based occupation. People within the project areas are found involve in agriculture, Trade & Commerce (Business), Crafts, Teaching, Manual labors, and others.
Health and Sanitation

According to District Public Health office and official records of MCOMS, major health problems associated with local people are common cold, typhoid, diarrhea, respiratory diseases, gastro-intestinal diseases, malnutrition, water borne diseases and many others. The health status of any area is also influenced by quality of drinking water supply facilities. The household numbers on the basis of water supply and sanitation facilities is shown in table 15 and table 16 respectively.

Table 15: Household by main source of drinking water

<table>
<thead>
<tr>
<th>Municipality</th>
<th>Piped Water</th>
<th>Tubewell</th>
<th>Kuwa (covered)</th>
<th>Kuwa (uncovered)</th>
<th>Spout Water</th>
<th>River</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pokhara</td>
<td>82,964</td>
<td>137</td>
<td>719</td>
<td>733</td>
<td>1877</td>
<td>309</td>
</tr>
</tbody>
</table>

(Source: CBS, 2011)

Table 16: Household by type of Toilet

<table>
<thead>
<tr>
<th>Municipality</th>
<th>Household Without toilet</th>
<th>Household With toilet</th>
<th>Flush Toilet</th>
<th>Ordinary toilet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pokhara</td>
<td>470</td>
<td>83,679</td>
<td>4,836</td>
<td></td>
</tr>
</tbody>
</table>

(Source: CBS, 2011)

Public Services and facilities

Education

The literacy rate of the Kaski District is 82.38%. male Literacy is 90.10% and female rate is 75.35%, (DCC, 2070/071). The Literacy rate of Pokhara Metropolitan municipality is higher than the district average. In comparison to the literacy rate of the other parts of country women literacy rate of Pokhara Metropolitan city is satisfactory. There are 8 colleges and 24 schools in the Ward No.11 of Pokhara Metropolitan. During field visit, it was noticed that people are conscious on importance of education and enrollment of
younger generation for further studies have been noticed and literature review shows increasing trend of education attainment in Pokhara city. According to recent survey by metropolitan office, the literacy rate of metropolis is 86.94 percent.

**Health Facility**
Numerous health institutions are located in Pokhara city. Major Health institutions available in Pokhara Metropolitan city are as follows:

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Name of Health Care Institutions</th>
<th>Type</th>
<th>Sanctioned Beds</th>
<th>Available Beds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manipal Teaching hospital</td>
<td>Private</td>
<td>750</td>
<td>750</td>
</tr>
<tr>
<td>2</td>
<td>Western Regional Hospital</td>
<td>Government</td>
<td>450</td>
<td>450</td>
</tr>
<tr>
<td>3</td>
<td>Gandaki Hospital</td>
<td>Private</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>4</td>
<td>Fewacity Hospital</td>
<td>Public</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

(Source: District Public Health office, 2013)

**Communication**
According to Nepal Telecom and Private Communication sources, more than 20,000 telephone lines have been already distributed in Pokhara Metropolitan city and more in progress. Mobile phones and internet services are in use more and more every day. Project site is connected with every form of communication services and hospitals itself have telephone lines with 24 hr. internet facilities. Number of radio stations, print magazines and courier services are available in the city.

**Electricity**
Almost all the residents nearby hospital area are connected with electricity line. In case of emergency backup facilities of Inverters, UPS and Generators were also observed in many households during field study. In the college, there is 2 units of diesel generators of total capacity of 500 KV for round the clock power backup.

**Hotels and Lodges**
Pokhara is the major tourism Hub in Nepal. Tourism plays a vital role in Pokhara since thousands of tourists visit Pokhara every year and majority of people are involved in the tourism sector. There are more than 250 tourist category hotels and lodges in Pokhara of which two (the Fulbari Resort and Pokhara Grande) are ranked 5-star. Pokhara provides food and lodging from backpackers to deluxe ranges.

**Religion and Cultural Sites/Activities**
There are numerous temples and gumbas in and around Pokhara valley. Most popular among them are Taal Bahrahi, Bindhyabasini, Gupteshwor Mahadev, World Peace Pagoda etc. However, major historical and religious monuments are not observed around the hospital site. However, there are no. of small monuments for day to day prayers. Ganesh Mandir is located around 200m from the hospital. Major religious/cultural
festivals and activities observed in the area are Dashain, Tihar, Maghe Sakranti, Saune Sakranti, Lhosar, Teej etc.
CHAPTER 4: EXISTING ENVIRONMENTAL MANAGEMENT SYSTEM AT HOSPITAL

While designing the building infrastructure and other associate facilities of the college, some of the mitigation measures are incorporated in design drawings. Some of them are:

- The design has reflected the current demand as well as the increasing demand and health care responsibilities of the future.
- The design has flexible plan such that complete recycling and updating may be possible for probable demand in future.
- The exterior of the building has incorporated material, color, texture etc. that are contemporary with the environment, enhancing the healing and comfortable atmosphere.
- Easy access is provided in the hospital complex for outpatients, diagnostic and treatment services.
- The functional relationship and use of space are thoroughly integrated for maximum efficiency, comfort and delight.
- The use of glass and light transmitting screen in are judiciously used to let in natural light and ventilation in areas that need them.
- Flow between floors and function are evident and rational.
- The inclusion of shops and public facilities has provided comfort and easy availability of services.
- Clinics and general nursing wards are planned allowing the facility to absorb the daily patient load without overtaxing patient and staffs.
- Centre and data processing facilities and desktop information for all departments and doctors have also been provided.
- The major operation theaters are located in a more secluded upper floor creating calm, clean, and comfortable and equipped with modern facilities.
- Canteen is provided for visitors There are properly posted treatment areas in the nursing cell in the central core.
- Adequate facilities for staff comfort and area for mechanical, medical equipments are provided.
- Parking and transportation are properly planned.
- Deep tube well is provided for water supply and treatment plant has been set up to improve water quality.
- Innovative ventilation system is provided to bring down the AC load as to eliminate the chances for infection.
- Doctors’ quarters are planned to ensure that medical services shall be available (in house) for all emergency.
- All the rooms of the hospital building have good ventilation
- There is a provision of a comfortable stairway to the hospital main building from road.

4.1 WASTE MANAGEMENT

The waste generated varies on a daily basis, depending on the number of patients, number of operations performed, and the number of maternity cases along with the flow of patients through the OPD.
Waste Segregation and existing collection facilities are as follows:
- Staff are mobilized to collect the waste from various Wards, Sections & Departments, adhering to all safety protocol.
- Separate dustbins have been provided to the wards to collect waste separately as:
  - Syringes
  - Needles
  - Bottles
  - Plastic ware
  - Food items
  - Gauze cotton
- Waste has been segregated from the source of generation.

**Prevention / Treatment & Disposal Practice**
- Reusable items are decontaminated using Autoclaves and then reused.
- Disposable items are decontaminated before disposal.
- Paper, Plastic bottles, metal cans are recycled and sent to the municipal container.
- Vegetable and food items are sent to local pig farmer.

**Health Care Waste Management Cell**
For effective implementation of the existing orders, directives, Health Care Waste Management Guidelines and SOP on Disposal of Bio-Medical Waste generated at Manipal Teaching Hospital, Pokhara, a Waste Management Cell has been constituted. The composition of the cell will be as under: -

Chairman - Head HR and Administration
Members -
1. Prof. Dr. AL Sharma, Community Medicine, Technical Advisor
2. Executive (Logistic)
3. House Keeping Supervisors

MCoMS has been managing its own Centre for health care waste. The waste Management Cell, MEMG (Nepal) has functioned as per the SOP on the subject and ensures proper disposal of bio-medical waste.
Medical waste management practices are:

**Health care waste**
- Provision of separate space for solid waste management within the vicinity of hospital
- Inhouse orientation relating to medical waste management provided to the staffs
- Segregation of medical waste using different colored bucket are practised
- Infectious waste such as syringe, gloves etc are autoclaved and recyclable items are recycled.
- Anatomical waste collected are disposed in a pit

**General Solid Waste**
- Organic/canteen wastes are sold to the pig farmers.
- Transportation of solid waste is done by municipality vehicles to dispose in designated municipal landfill site.
Total general waste generated per day in MCOMS is 120 kg. The infectious waste generated is around 5-6 kg per day from each ward.

Capacity of Autoclave at Waste Management Centre is:
- Gross Capacity - 285 kg
- Working Capacity - 250 kg

**Mercury use:**
Purchase of mercury containing thermometers has been stopped. There is need to replace the mercury thermometers.

**Laser Beam Technology for X-Ray Reports**
X-Ray film usually do contain concentrations trace amount of silver, which can be toxic if disposed in medical red bags or in Sharps containers. The lead content can also be very dangerous during the disposal of reports. To overcome this hazard of X-rays disposal, Manipal Hospital has introduced laser beam technology which produces safe and easily disposable X-Rays reports.

![Figure 18: X-rays Sheets used by laser technology](image)

**4.2 INFECTION CONTROL PROGRAM**
As an infection control program there is a Hospital acquired surveillance committee (HIASC) has been formed under the chairmanship of Hospital Director. As a process of the infection control fumigating is done in every 3 months, Swab culture is done in every month, daily cleaning is performed using chlorine tablets and autoclaving is done. For occupation health and safety measures gloves, masks are used in each ward to prevent contact with disease.

Hospital Acquired Infection Surveillance Committee (HIASC) has been formed under the chairmanship of Hospital director as follows:
1. Hospital Director – Chairman
2. HOD Anesthesia Department- Member
3) Matron- Member
4) Chief hospital Administrator- Member
5) Representative of Microbiology Department- Member Secretary

**Process of Infection Control:**
1) Fumigating is done in every 3 months
2) Swab culture is taken every month
3) Daily cleaning is performed using Chlorine tablets
4) Autoclaving is done

**Process of Infection Control in O.T:**
1) Aseptic Technique of proper gloving, gowning, handling of sterile equipment
2) Fumigating every week or after infected case
3) Redline awareness
4) Proper cleanliness of O.T by virex, chlorino etc
5) Proper sterilization of equipments
6) Close of door and less crowd in O.T during surgery
7) Use of Aseptic solutions like betadine, spirit, savlon
8) Routine swab culture for wall, floor and in bed in O.T
9) Proper use of dress, mask, cap and sleepers only in O.T

**4.3 OCCUPATIONAL HEALTH SAFETY MEASURES**

The following measures are carried out for occupational health safety
- Sterilized dressing and clinical set by auto claves
- Sterilized gloves, utility gloves and procedure gloves, mask
- CCTV monitoring
- Patients on 24 hr surveillance
- Power back up

There is an occupational health and safety awareness sessions for staffs working in those sections and timely monitoring has to be done by hospital authority. Periodic training on safe disposal of waste are given training to observe precautionary measures, use of masks, goggles, gum boots and other items.

**4.4 PROPER STORAGE OF CHEMICALS**

The hospital exhibited the following measures for chemical storage:
- Proper labeling of rack for chemical storage
- Labeling of bottle and containers as name of chemical, manufacture, date, expiry date, batch no etc
- Some reagents are kept in refrigerator maintaining 2-8 degree temperature as necessary.
- Some reagents are kept in room temperature rack
- Acids are kept in closely tightened brown bottle
- Alkaline and peroxides are kept in closely tightened plastic bottle
- Culture bottles are kept in refrigerator before incubation.

4.5 FIRE SAFETY

For fire safety, fire alarm and fire hydrant system are installed in the main hospital as well as the college building. A separate tank of 4 lakh litres capacity is kept reserve for fire fighting purpose. Fire extinguishers are also installed in each floor. Fire extinguishers are monitored and refilled every 2-3 years depending on its expiry date.

In hospital there is a good practice of refilling fire extinguishers but along with that there should be leakage check and also replacement of the new extinguishers if needed.

4.6 WATER SUPPLY

The water for hospital purposes is used from Municipal pipeline as well as extract from three deep boring (from 200 feet). For the purification of water, water filter and reverse osmosis process is used and purified water is distributed in whole the hospital compound.

Pokhara khanepani Sansthan is the regular water supplier in the hospital. The water from drinking water supplier and deep boring are treated before being used. Water quality monitoring is done through lab test once in every 2-3 months; sample water quality test report is attached in Annex H.

4.7 DRAINAGE AND SEWERAGE SYSTEM

There is proper drainage facility present; separate sewer line for the grey water and black water. The waste water that comes out from the O.T and Hospital wards, is discharged into the soakpit with 3 feet x 25 feet and those water are treated with bleaching powder once in 2-3 days. Grey waste water that comes out from the other wards i.e. from laundry, wash basins and other washing purposes and the runoff water are piped out using the 2 feet diameter sewer line. Storm water is also discharged using the same sewer discharged into the seti river.

There is a waste water treatment facility present at the hospital. Waste waster generated from hospital is categorized into two types; general waste water and chemical contaminated waste water. Effluent treatment plant is operated by the hospital itself for the treatment of waste water. The schematic diagram of the effluent treatment plant is shown below:
Figure 19: Process flow diagram for ETP plant

4.8 MAINTENANCE SECTION

For the smooth running of drainage, water supply, power supply and other necessary medical equipments, a well-equipped maintenance department is present in MCOMS. The available human resource for the maintenance section is as follows:
Table 18: Human Resource in Maintenance section

<table>
<thead>
<tr>
<th>S.N</th>
<th>Field of Expertise</th>
<th>Full Time</th>
<th>Part Time</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hospital Administrator</td>
<td>4</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Account officer</td>
<td>8</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>Receptionist</td>
<td>10</td>
<td>-</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>Storekeeper</td>
<td>6</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>Helper/cleaner</td>
<td>50</td>
<td>-</td>
<td>50</td>
</tr>
<tr>
<td>6</td>
<td>Security guard</td>
<td>20</td>
<td>-</td>
<td>20</td>
</tr>
<tr>
<td>7</td>
<td>Driver</td>
<td>8</td>
<td>-</td>
<td>80</td>
</tr>
<tr>
<td>8</td>
<td>Gardener</td>
<td>6</td>
<td>-</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>112</strong></td>
<td>-</td>
<td><strong>112</strong></td>
</tr>
</tbody>
</table>

List of staffs working in waste management section (collection, segregation, transportation etc.) given in table below:

Table 19: List of staffs working in waste management

<table>
<thead>
<tr>
<th>SN</th>
<th>Section</th>
<th>Work Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Waste Management Section</td>
<td>Waste Management Officer (supervise, coordinate, train, monitor, implement overall waste management)</td>
</tr>
<tr>
<td>2</td>
<td>Waste Management Centre</td>
<td>Handling Autoclave and overall management</td>
</tr>
<tr>
<td>3</td>
<td>Waste Management Centre</td>
<td>Final Segregation</td>
</tr>
<tr>
<td>4</td>
<td>Waste Management Centre</td>
<td>Final Segregation</td>
</tr>
<tr>
<td>5</td>
<td>Concerned Doctors, Nurses, Attendants of the concerned Wards will involve in segregation at Source</td>
<td>Segregation</td>
</tr>
<tr>
<td>6</td>
<td>House Keeping</td>
<td>Transportation</td>
</tr>
<tr>
<td>7</td>
<td>House Keeping</td>
<td>Transportation</td>
</tr>
<tr>
<td>8</td>
<td>House Keeping</td>
<td>Transportation</td>
</tr>
<tr>
<td>9</td>
<td>House Keeping</td>
<td>Transportation</td>
</tr>
<tr>
<td>10</td>
<td>House Keeping</td>
<td>Transportation</td>
</tr>
<tr>
<td>11</td>
<td>House Keeping</td>
<td>Transportation</td>
</tr>
<tr>
<td>12</td>
<td>House Keeping</td>
<td>Transportation</td>
</tr>
</tbody>
</table>

No. of staffs working in gardening/greenery: 2

4.9 LOCAL EMPLOYMENT

The hospital has given main priority to local employment. Staffs have been recruited from nearby Settlement i.e. Phulbari, Ward 11 of Pokhara Metropolitan city. MCOMS has been contributing in the upgrading local infrastructure to build the road between academic building and hospital, which is also being used by the public for better access to the above-mentioned area.
4.10 COMMUNITY DEVELOPMENT ACTIVITIES

The importance of the health sector frequently surfaces in discussions surrounding community development. In many ways, hospitals and health-care organizations contribute to the stability and growth of the local economy. MCoMS has also been responsible for the development of Social Activities regarding education, concessions offered to the patients, health outpost and camps etc. The community developmental activities offered by MCoMS can be discussed under the following headings:

Social Responsibility Concessions offered to Patients
- Special concessions to underprivileged patients
- 10% Free beds for Poor patients (Govt. Scheme)
- Subsidized surgery
- Concessions ranging from 25-75 % in various investigations for both OP and IP
- Upto 50% concessions on radiotherapy for cancer patients

Social Accountability in Education
- MBBS (20% free seats earmarked for Nepal Govt. and minimum 15% subsidized seats for Nepali Students)
- Nursing (5 % free seats in PCL Nursing and 2 seats subsidized in PCL & B.Sc. Nursing)

Corporate Social Responsibility – Programmes for public benefit
- Dialysis programme for govt. cases through HD unit
- Comprehensive Abortion Programme through Comprehensive Abortion Centre (CAC)
- Safe Motherhood Programme – Normal, complicated and Caesarean deliveries free of charge (including medicines) plus NPR 1000 incentives to mother
- Govt. sponsored ENT, General Surgery and Dental programmes
- Nepal Health Insurance Scheme
- Free Government sponsored hysterectomy programme
- Poor Patient Fund (PPF)- Asha(आशा), a Non-governmental organization(NGO) which is run by the students
- Ex-servicemen Contributory Health Scheme (ECHS) for retired armed forces

CSR – Outreach Programmes & Clinics
- Free Multi – speciality Medical Camps in remote areas with Health training
- Free Medical Clinics (Kaski, Parbat, Syangja, Myagdi and Tanahu districts)
- General Purpose Medical Camps at MCOMS

Health outposts and camps
- Daily Clinic at Lamachaur
- Regular weekly Clinics at Dhulegau, Naudanda, Korean Camp and Pension Camp
- Camps organized at various places
• Six monthly health assessments of children
• Monthly Family Planning Camps

4.11 SANITATION, HYGIENE AND FOOD SAFETY

Food borne illnesses constitute a public health issue. Unsafe food can cause many acute and life long diseases, and in some instances death. Vulnerable persons, such as the elderly, young children and infants, pregnant women, and the immunocompromised, are at higher risk of a food borne illness. A Hospital canteen is required to ensure that a food service facility’s premises, fixtures, fittings and equipment are designed and constructed to be easily and effectively cleaned and, where necessary, sanitised. Premises are to be provided with the necessary services of water, waste disposal, light, ventilation, cleaning and personal hygiene facilities, storage space and access to toilets. MCOMS has outsourced the other company for maintaining sanitation and hygiene in the hospital and college premises. Similarly, MCOMS has given special attention in
  • implementing food safety requirements to achieve compliance with the food standards
  • monitoring and managing compliance with the Food Safety Directives
  • investigating complaints
  • providing for adequate design, construction and maintenance of food service facilities
  • providing staff training
  • providing adequate food labelling
  • nominating a food safety supervisor(s)
  • taking action to remedy non-compliances identified if any during supervision
CHAPTER 5: IDENTIFICATION AND ASSESSMENT OF IMPACTS

5.1 IMPACT IDENTIFICATION, ASSESSMENT, PREDICTION AND EVALUATION

This section identifies, predicts and also evaluates the environmental impacts of the activities of the proposal.

The identified impacts have been classified under the beneficial impacts and adverse impacts. These impacts have been further classified into construction phase and operation phase. Effort has also been made to further classify them into physical impacts, biological -impacts, socio-economic impacts and cultural impacts as given below:

Using the provisions as given in National EIA Guidelines (NPC/IUCN, 1993), impacts have been predicted and quantified, where possible and then evaluated again by using the scoring system. The impacts have been evaluated in terms of type of impacts as to direct or indirect; in terms of magnitude as high, medium or low; in terms of extent as to regional, local or site specific; and in terms of duration as to short term, medium term or long term.

The Environmental impacts are 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) (Uprety B., 2003).

For the Impact evaluation, the matrix method with numerical ranking is used for the quantitative ranking of the predicted impacts. The numerical scale mentioned in the National EIA Guidelines, 1993 has been adopted for this project. The numerical scale is as:

<table>
<thead>
<tr>
<th>Magnitude</th>
<th>Extent</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Regional</td>
<td>Long Term</td>
</tr>
<tr>
<td>Moderate</td>
<td>Local</td>
<td>Medium Term</td>
</tr>
<tr>
<td>Minor (low)</td>
<td>Site Specific</td>
<td>Short Term</td>
</tr>
</tbody>
</table>

The impact which will occur inside the project is termed as Site Specific and which goes up to ward and Municipality level is termed as Local and which goes up beyond the municipal level is termed as Regional. The combined score up to 45 is termed as insignificant impact; 45-75 is termed as Significant and beyond 75 is termed as very significant impact.
5.2 ISSUES RAISED BY PUBLIC AND STAKEHOLDERS DURING FIELD VISIT

Public consultation were organized within and around the premises of MCoMS in 2075-02-30 - 2075-03-04B.S. including representative from different sectors such as patients, students, local people and staffs. The opinions, suggestions, demands and issues raised by concerned stakeholders were noted, analyzed and prioritized. The basis for prioritization was expert judgment and verification on objectively, relevance, significance, seriousness, truthfulness and acceptability of the comments and suggestions obtained. The concerns during group discussion were as follows:

- The local community was thankful to MCoMS for organizing such consultation and interaction programmes
- The complaints and grievances received from the local community, patients and employees should be handled properly
- The commitments by the hospital to the local should be fulfilled
- Most of the people in the project area were positive about the operation of hospital and its ongoing impacts on economic upliftment in the project areas
- People raised issues of efficient delivery service from Pharmacy section
- Patients raised issues of better medical reports management
- Special discount should be provided to local people in hospital services

5.3 ISSUES IDENTIFIED BY STUDY TEAM FOR EIA STUDY

Operation and Maintenance Stage

Beneficial Issues

Boost in local economy- regular operation of the proposed project will create opportunity for related trade and business. Moreover, the project will pay revenue to government through metropolitan which will ultimately increase the local economy.

Establishment of MCoMS has significantly increased the economic activities in and around the project sites. Influx of the students and patients has created opportunities for many such as establishment of eateries, restaurants, tea stalls, grocery shops, pharmacies, departmental stores and it has become a market center for Phulbari area. The number of suppliers supplying various hospital related items and other commodities has increased. These activities have lead to more business in the area which has improved the socio-economic status of the people. The magnitude is high, extent is local and the duration is long term. The impact is indirect and very significant.

Health care opportunities for local people and outsiders

The main benefit from the setting up of the MCoMS in the Phulbari area has made the availability of the health services to the locals as well as to people of inside and outside of Pokhara. The medical hospital has been providing services to the people mainly
through outdoor patient department, indoor patient department and emergency services. The average occupancy of OPD (Out Patient Department) is 1000 patients per day and average occupancy of IPD (In Patient Department) is 400 per day in F.Y 074-075. Average bed occupancy is observed 48% out of 750 beds available. This service of the teaching hospital has helped to enhance the healthcare conditions and the well being of the people. Additionally, Health services are also provided to the community through the health camps and health posts conducted daily, weekly and at six months at different places of Pokhara valley. The magnitude is high, extent is regional and the duration is long term. The impact is direct and very significant.

**Employment opportunity to locals**

A large number of professionals and other staffs have been involved in hospital to provide medical services to the people. There are large numbers of qualified medical science professionals to provide medical education. Similarly, nurses, technicians, administrative staffs and many other people have been getting direct and indirect employment. In total, more than 1,000 people has got the employment opportunity in the medical college and among them, 308 persons are from the local area. Besides, in the adjacent area of the MCoMS, many people have been engaged in providing other additional services and income generation activities by establishing pharmacy shops, groceries or community stores, restaurants, and eateries. The MCoMS has employed directly and indirectly to generate various employment opportunities. The magnitude is moderate, extent is local and the duration is long term. The impact is direct and significant.

**Adverse Issues**

**Physical Environment**

**Issue of solid waste management**

Chemical and pharmaceutical waste comprising of various chemicals and pharmaceuticals used during operation stage may cause land pollution. Healthcare waste in the form of solid waste is the main source of pollution from the operation of this MCoMS. Healthcare waste includes all waste generated by healthcare establishments, research facilities, and laboratories. The medical waste stream is an extremely complex waste. Details of types of waste generated in MCOMS are mentioned in the Annex G. The magnitude is high, extent is site-specific and the duration is long term. The impact is direct and very significant.

**Issue of liquid waste management**

Construction and operation of of various physical infrastructures and facilities may pressurize and disrupt natural water drainage system of project area. The waste water and semi-liquid waste are also generated during the operation of the medical college. Incompatible pollutants in wastewater flow and chemicals are the sources of water pollution. Direct disposal of waste water could pollute other natural water bodies and
may impact on health of local people. There are mainly two sources of waste water generation. The first one is the infectious wastewater generated from laboratories, x-ray department and disinfection works; and the second from the organic wastewater generated from toilet, kitchen and bathroom in the hospital and the medical college. Also, the seepage of wastewater may pollute groundwater which is one of the major water sources of urban settlement. The magnitude is medium, extent is local and the duration is long term.

**Issue regarding possible burning of hospital wastes**

Burning waste pollutes the environment in many ways. Mercury, dioxins, lead, and other pollutants come from burning waste. In terms of climate impacts, incinerators emit more carbon dioxide (CO₂) per unit of electricity than coal-fired power plants. Since hospital waste contains more toxic substances, incineration of these wastes can be more dreadful. However, Manipal hospital has already discarded incinerator and has installed autoclave. Burning is done only for paper waste and hospital toxic wastes are autoclaved. So, the envisaged impact is medium, extent is local and the duration is medium term.

**Issue of energy fulfillment for the hospital operation**

Hospitals consume large amounts of energy because of how they are run and the many people that use them. They are open 24 hours a day; hundreds of employees, patients, and visitors occupy the buildings daily; and sophisticated heating, ventilation, and air conditioning (HVAC) systems control the temperatures and air flow. In addition, many energy intensive activities occur in these buildings: laundry, medical and lab equipment use, sterilization, computer and server use, food service, and refrigeration. So, the energy consumption by the hospital is quite more. Since, direct line is taken from NEA and generators can be used in case of emergency. The envisaged impact is low, extent site specific and duration is short term.

**Issue of lowering water table due to extraction of groundwater and effect on adjoining source**

There are three deep bores inside the hospital premises. The ground water has therefore been extracted from the bores. These might cause the lowering of the existing water table which can also affect the other ground water sources nearby the hospital. Similarly, over extraction of ground water can cause ground water related subsidence. Since, the hospital is in Pokhara city, which is known for heavy rainfall throughout the country and also there is a provision of rain water harvesting near bore hole, there will not be much disturbance for ground water recharge as that in the area with low rainfall. So, the envisaged impact is low in magnitude, local in extent and duration is short term.

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

Since Nepal lies in the fifth seismic zone, earthquake can occur at any time and can cause huge damage. Manipal Hospital buildings are RCC framed permanent structure designed for fifth seismic zone of earthquake. Most of the buildings at the medical college are low rise building with either one or two storey, which are also designed as per the design
criteria. The Fire alarm and fire hydrant system has been installed in the main hospital. Fire extinguishers are also installed in each floor. An emergency exit is additional solutions as emergency response. The magnitude is medium, extent is local and the duration is long term. The impact is indirect and significant.

Chemical Environment

Radiation hazard from radiological equipments
The exposure of hazardous radiation could be mainly from x-ray department. Staffs working with those equipments are usually exposed to such radiation which is very much unsafe. The occupational health is in risk due to this hazardous radiation equipment. Proper handling of hazardous radiation equipment, proper outfits and awareness should be provided to staffs exposed to such equipments. The magnitude is high, extent is site-specific and the duration is long term. The impact is direct and very significant.

Chemical and heavy metal wastes and effluent
Chemical waste comprises of discarded solid, liquid and gaseous chemicals e.g. Housekeeping and disinfecting products such as waste anaesthetic gases, formaldehyde solutions. Other sources of chemicals and heavy metals in the hospital are from mercury thermometer, X-rays films etc. The source of heavy metal in hospital wastewater can be originated from numerous sources such as from feces, cleaners, paints and wear and tear of utensils and equipment. So, exposure to these harmful chemicals and heavy metals in waste water and solid waste can increase toxic levels which can do extensive damage, especially to the nervous system and kidneys. So, the impact is high in magnitude, local in extent and long term in duration.

Contamination of ground water
The possible contamination of ground water sources in the hospital are due to onsite sanitation systems, effluent from wastewater treatment plants and leaking sewers. The ground water contamination can cause health, economical and environmental losses. Diseases like cholera, hepatitis, dysentery can occur. The land value of the area decreases and it will also ultimately hamper the ecosystem. Therefore, the contamination of ground water has an impact of high medium magnitude, local in extent and long term in duration.

Air pollution due to handling of chemicals and burning of waste
The main sources of smoke or flue gas and air pollutants are from the operation of generator. Operation of generator is needed during load shedding period. Dust/smoke is also generated due to vehicle movement in and around the MCoMS areas. The magnitude is low, extent is site specific and the duration is long term. The impact is direct and insignificant.

Biological Environment

Greenery maintenance and protection
The greenery maintenance and its protection are very important since deforestation nowadays is causing serious environmental issues. Green area within hospital not only increases aesthetic view but also helps in purifying the toxic air and maintains fresh environment. Manipal hospital has allocated two-third of the total area for maintaining green environment. The maintenance problem may occur only in absence of gardener, so the envisaged impact is low in magnitude, site specific in extent and short term in duration.

**Impact on aquatic environment due to sewerage**

Sewage contains a wide variety of dissolved and suspended impurities. It amounts to a very small fraction of the sewage by weight, but it is large by volume and contains impurities such as organic materials and plant nutrients that tend to rot. The main organic materials are food and vegetable wastes. Hospital sewage contains more disease-causing microbes than domestic sewage. The various substances that we use for cleaning such as detergents add to water pollution because they contain harmful chemicals and also soften the water. When sewage enters a lake or stream, microorganisms begin to decompose the organic materials. Oxygen is consumed as micro-organisms use it in their metabolism which will ultimately degrades the aquatic ecosystem. Seti river is located nearby the Manipal Hospital. Disposal of untreated sewage can cause huge damage to the river and aquatic ecosystem. Since, Manipal hospital have been operating waste water treatment plant of its own, and the effluent tested before the final disposal are within the standards, the envisaged impact is low in magnitude, local in extent and long term in duration.

**Socio-economic and Cultural Environment**

**Issue of Occupational health and safety of the workers**

The health and safety of hospital staffs and patients in teaching hospital and students, teachers and other staffs in medical college unit is of prime concern of the top management of the medical college. If necessary awareness and skills are not imparted, handling of equipment and chemicals may result in occupational diseases and accidents. Although the primary victims could be the staffs, students, patients and care takers, sometimes the local people may be affected too. Radioactive waste, chemical waste, infectious waste, sharps and various other bio-medical wastages may induce hazards in the surrounding residential area. The magnitude is high, extent is site specific and the duration is long term. The impact is direct and very significant.

**Food safety issues for patient, visitors and staffs**

MCoMS is also a health care institution that provides treatment for the patient and patients are more prone to communicable diseases. The main sources of transfer of these diseases are food and sanitation. Foods available in the hospital canteen should be of assured quality. Otherwise, people specially patients who are more susceptible to another disease, will result in dreadful diseases. So, food quality is to be assured with frequent monitoring. The magnitude is medium, extent is local and the duration is long term. The impact is indirect and significant.
**Issue of health and sanitation in and around the vicinity**

Hospital area is more prone to germs and diseases. Not only the patients visiting the teaching hospital but hospital, staffs and students, teachers and other staffs in medical college unit could also be vulnerable to pread of communicable diseases. The main sources of transfer of these through diseases are infected through patients through direct and indirect contact in air or vectors and also from food and sanitation. So, proper infection control mechanisms and quality is to be maintained in food and sanitation sector with frequent monitoring. Also, the improper management of dead bodies can create foul smell and unhygienic conditions in and around the hospital. The magnitude is medium, extent is local and the duration is long term. The impact is indirect and significant.

**Issues of Grievances**

Hospitals may have many grievances than any other institutions. Grievences can be from patients, visitors, staff members, workers etc. The grievances from the different people may not reach to the concerned authority in absence of communication. Grievances are the source that can be used for the better functioning of the hospitals. So, if there is no medium of collecting grievances and complaints about the functioning of the hospital, it will have bad impact in the image of hospital. Also, hospital must be operated in the effective way so that there will be minimum grievances. Since handling of grievances is an important issue, the envisaged impact is medium, extent is local and the duration is medium term.

**Pressure on community resources and infrastructure**

The flow of people in the hospital keeps on changing with respect to the demand of public and services provided by MCoMS. This flow adds pressure to the existing public utilities available at the location with the increase in the flow of population. The demand of this flow of population can have added pressure to the existing public utilities such as electricity, water supply, waste disposal and municipal drainage system facilities, transportation available at the location of the hospital and the medical college. The magnitude is medium extent is local and the duration is long term. The impact is indirect and significant.

**Law and order situation**

MCoMS has been providing the both service/facilities of teaching hospital and medical college. It is therefore, a huge institution where there will inflow and outflow of large number of people. Most of the students and doctors are permanently staying in the teaching hospital hostels and quarters. Some are staying in hostels, quarters and some in rent nearby the hospital. Staffs of the hospital are from mostly different parts of Nepal and also from India. Similarly, Students are from different parts of the world i.e. from India, Singapore, Bangladesh, USA etc. So, there might occur social conflict between the people due to difference in nationality, religion and other ways of lifestyles. People from other countries may not be able to respect the Nepalese culture. So, the envisaged impact is medium magnitude, long term in duration and extent is local.
The adverse impacts as given above have been evaluated in terms of type of impacts as to direct or indirect; in terms of magnitude as high, medium or low; in terms of extent as to regional, local or site specific; and in terms of duration as to short term, medium term or long term. The scoring systems as given in the National EIA Guidelines have been used and the cumulative scores on these analyses have been used to decide on the significance of the impacts as given in the Table 20.

<table>
<thead>
<tr>
<th>Likely impacts</th>
<th>Nature of impacts</th>
<th>Total score</th>
<th>Significance of impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical Environment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Issue of solid waste management</td>
<td>direct</td>
<td>H</td>
<td>Ss</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60</td>
<td>10</td>
</tr>
<tr>
<td>Issue of liquid waste management</td>
<td>direct</td>
<td>M</td>
<td>Lc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Issue regarding possible burning of hospital wastes</td>
<td>direct</td>
<td>M</td>
<td>Lc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Issue of energy fulfillment for the hospital operation</td>
<td>direct</td>
<td>L</td>
<td>Ss</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Issue of lowering water table due to extraction of groundwater and effect on adjoining source</td>
<td>Indirect</td>
<td>L</td>
<td>Lc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Issue of disaster risk reduction (Earthquake, fire hazards, lightning, electrocution) in hospital</td>
<td>Indirect</td>
<td>M</td>
<td>Lc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td><strong>Chemical Environment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radiation hazard from radiological equipments</td>
<td>Direct</td>
<td>H</td>
<td>Ss</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60</td>
<td>10</td>
</tr>
<tr>
<td>Chemical and heavy metal wastes and effluent</td>
<td>Indirect</td>
<td>H</td>
<td>Ss</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60</td>
<td>10</td>
</tr>
<tr>
<td>Contamination of ground water</td>
<td>Indirect</td>
<td>M</td>
<td>Lc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Air pollution due to handling of chemicals and burning of waste</td>
<td>Indirect</td>
<td>L</td>
<td>Ss</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td><strong>Biological Environment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greenery maintenance and protection</td>
<td>Indirect</td>
<td>L</td>
<td>Ss</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Impact on aquatic environment due to sewerage</td>
<td>Direct</td>
<td>L</td>
<td>Lc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td><strong>Socio-economic and Cultural Environment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Issue of Occupational health and safety of the workers</td>
<td>Direct</td>
<td>H</td>
<td>Ss</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60</td>
<td>10</td>
</tr>
<tr>
<td>Food safety issues for patient, visitors and staffs</td>
<td>Direct</td>
<td>M</td>
<td>Lc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Likely impacts</td>
<td>Nature of impacts</td>
<td>Total score</td>
<td>Significance of impacts</td>
</tr>
<tr>
<td>----------------</td>
<td>------------------</td>
<td>-------------</td>
<td>------------------------</td>
</tr>
<tr>
<td></td>
<td>Type</td>
<td>Magnitude</td>
<td>extent</td>
</tr>
<tr>
<td>Issue of health and sanitation in and around the vicinity</td>
<td>Direct</td>
<td>M</td>
<td>Lc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Issues of Grievances</td>
<td>Direct</td>
<td>M</td>
<td>Lc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Pressure on community resources and infrastructure</td>
<td>Indirect</td>
<td>M</td>
<td>Lc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Law and order situation</td>
<td>Indirect</td>
<td>M</td>
<td>Lc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>
CHAPTER 6: ALTERNATIVE ANALYSIS

The significant and important impacts of the project are being scrutinized, studied and compared with other alternatives. Alternatives are examined to arrive at implementation options and to maximize the benefits and avoid or minimize the unwanted impacts. During alternative analysis, scale and location of the project, environmental issues, design, raw materials and construction technology, economic factors and operational modalities are considered. Such analysis provides adequate information on possible impacts of each alternative on the environment. A comparison of adverse impacts against beneficial impacts is included in the Environmental Impact Assessment (EIA) report while considering the alternatives of the project. The various project alternatives are discussed as follows:

6.1 IMPLEMENTATION OF PROJECT OPTION

The project area results in no loss of arable land. It has been observed that there is very limited impact to the land, water, air and biological environment due to the project implementation if complied with proposed mitigation measures. Hence the project could easily be continued without any alternative option.

6.2 NO ACTION OPTION

This College has helped to create job opportunities to considerable number of people including local peoples and also provided health care services to people in Gandaki region. It has also contributed in production of health service professionals. Therefore, there is a high level of local community support. Few adverse impacts are predicted which can be well mitigated with the proposed mitigation measures and no significant alternative is required for the project. The do-nothing situation may conserve the environment in its original state but is not in harmony with the need of health facilities in Nepal. So, this alternative is regarded as not viable.

6.3 CHANGES IN TECHNOLOGY

The college and teaching hospital has emphasized for the optimum use of environment friendly technology such as energy efficient equipments, equipments and machineries with less noise pollution and emission generation. Similarly, college has used solar like renewable energy technology to the extent possible.

6.4 ALTERNATIVE PROCEDURE OF OPERATION

The wastes generated from the operation of the teaching hospital are solid waste, waste water and air pollution. Similarly, alternative technologies for the hazardous and non-
hazardous waste water treatment were explored. Wastewater treatment facility established by the college itself.

6.5 OPERATIONAL PROCEDURES

All available and known tested and proven operational manual of Medical College and Teaching Hospital are explored. Operational Manual is developed and documented. All employees or staffs are trained and instructed according to the manual so that there is least deviation in operation and working from the SOP. The operational procedures have undergone through continual improvement by adopting the quality management system leading to ISO certification.

6.6 ENVIRONMENTAL MANAGEMENT SYSTEM

The Medical College and Teaching Hospital has followed all rules and regulations, and guidelines related to Environment. The institution has adopted viable and beneficial environment related concepts and systems like Cleaner Production, 3R, Hazard Analysis and Critical Control Points (HACCP) and EMS.

Auto Clave for Hazardous Waste

The main waste generation from the operation of this teaching hospital is solid waste. Alternatives concerning the equipments and systems for waste collection, waste storage, and management of sharps, internal as well as external transportation, and treatment of different types of wastes generated were considered and explored. For handling and treatment of infectious waste, various alternative treatment techniques like open burning, land filling, incineration, autoclaving were considered and autoclave is considered as the best alternative for this particular project. Open burning generates excessive air pollution around the area. Landfilling of such waste can result in the ground water pollution. Autoclave disinfection for all infectious waste will not only be excessively costly but it will generate wastes, which will need to be managed.

6.7 RISK ANALYSIS

There are two types of risks viz.; risk on return on investment and risk to environment, and health and safety of human beings. Risk analysis for return on investment has been carried out by investors and they have decided that it is a viable and safe investment with limited risk. There are possible risks to environment and safety and health of human beings when the assumptions made in the prediction and design are not close enough. However, some factors of safety is considered making the proposed health care waste management system of some higher capacity to minimize the risk. Emergency preparedness plan will be developed and staffs will be trained for these plans.
7: BENEFIT AUGMENTATION AND MITIGATION MEASURES

7.1 GAP ANALYSIS FOR MITIGATION MEASURES:

Gap analysis is done to study the ongoing operational status and to identify the gap that is needed to be implemented to minimize the environmental impacts due to the operation the Manipal Teaching Hospital.

Table 21 Gap analysis for mitigation measures

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Existing facilities/services</th>
<th>Gap identified</th>
<th>Additional mitigation measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Health care waste management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td>collection facility (existing dust bin: 70)</td>
<td>required no. of dust not found in all ward (required: 95)</td>
<td>30 dust bin to be added</td>
</tr>
<tr>
<td>1.2</td>
<td>Needle cutter</td>
<td>Required no of needle cutter was not found</td>
<td>5 needle cutter to be added</td>
</tr>
<tr>
<td>1.3</td>
<td>Autoclave (existing 100 litre volume, 1)</td>
<td>Autoclave size not enough to compared to volume of waste generated (563 Litre/day of waste generated)</td>
<td>1 autoclave to be added</td>
</tr>
<tr>
<td>1.4</td>
<td>Trolley (existing 36)</td>
<td>Required no of trolley not found</td>
<td>12 trolley to be added</td>
</tr>
<tr>
<td>1.5</td>
<td>Pamplet/brochure/sticker/flex</td>
<td>IEC materials found in only few wards</td>
<td>IEC materials need to be added in all the visible location of wards</td>
</tr>
<tr>
<td>1.6</td>
<td>Garbage bag (Large) + plastic bag (Small)</td>
<td>Additional garbage bag to be purchased for additional dustbin</td>
<td>additional nearly 11,000 bags/year to be purchased</td>
</tr>
<tr>
<td>1.7</td>
<td>Staff</td>
<td>Required no of staff were not found</td>
<td>Additional 1 staff required</td>
</tr>
<tr>
<td>2.</td>
<td>Management of sewage treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>Upgrading sewage system</td>
<td>Maintenance needs to be done</td>
<td>Regular monitoring and maintenance to be done</td>
</tr>
<tr>
<td>2.2</td>
<td>Construction of Sewage treatment plant</td>
<td>There is no sewage treatment plant</td>
<td>1 treatment plant need to be installed</td>
</tr>
<tr>
<td>3.</td>
<td>General solid waste</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1</td>
<td>Organic waste (collection is done by municipality)</td>
<td>There is no composting/biogas facility</td>
<td>1 biogas need to be installed</td>
</tr>
<tr>
<td>4.</td>
<td>cleanliness/sanitation/disinfection/laundry management activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Noise pollution control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.1</td>
<td>Installation of warning sign boards</td>
<td>Sign boards are found not enough</td>
<td>Installation of 2-3 sign boards</td>
</tr>
<tr>
<td>6.</td>
<td>Emergency response system system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.1</td>
<td>Fire extinguisher</td>
<td>Refilling of fire extinguisher gas</td>
<td>Refilling of fire extinguisher gas every 2-3 years</td>
</tr>
<tr>
<td>8</td>
<td>Water reuse</td>
<td>There is no existing rainwater harvesting system installed</td>
<td>Installation of rainwater harvesting system</td>
</tr>
<tr>
<td>S.N.</td>
<td>Existing facilities/services</td>
<td>Gap identified</td>
<td>Additional mitigation measures</td>
</tr>
<tr>
<td>------</td>
<td>-----------------------------</td>
<td>----------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>9</td>
<td><strong>Water supply</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.1</td>
<td>water tank/ Piping/fitting/water treatment plant</td>
<td>Required monitoring and maintenance</td>
<td></td>
</tr>
<tr>
<td>9.2</td>
<td>Existing 2 monitoring staff</td>
<td>Monitoring/maintenance staff is not sufficient</td>
<td>Additional 1 staff needed for monitoring of water supply</td>
</tr>
<tr>
<td>10</td>
<td><strong>Traffic management</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Existing 2 staffs</td>
<td>Enough staff seen for traffic management</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Existing 20 signals</td>
<td>Additional traffic signals</td>
<td>Installation of additional 4 signals</td>
</tr>
<tr>
<td></td>
<td>Health Awareness &amp; Coordination activities</td>
<td>Gap in co-ordination with local traffic</td>
<td>Co-ordination with local traffic for traffic management</td>
</tr>
<tr>
<td>11</td>
<td><strong>Greenery and landscape management</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Existing greenery is in 54,760 sq.ft</td>
<td>There are open space and additional greenery can be maintained</td>
<td>Additional 10,952 sq.ft of greenery to be maintained</td>
</tr>
<tr>
<td></td>
<td>Existing 2 staffs for landscape management</td>
<td>Additional staff necessary to maintain additional 10,952 sq.ft of greenery</td>
<td>1 staff need to be added</td>
</tr>
<tr>
<td>12</td>
<td><strong>Support to local development</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Previously support of NRs 3,00,00 was done for public road maintenance</td>
<td>Additional support should be done</td>
<td>NRs 1,00,00 will be done</td>
</tr>
<tr>
<td></td>
<td>Previously support of NRs 4,00,00 was done for Sewerage, Drainage maintenance</td>
<td>Additional support should be done</td>
<td>Nrs 1,50,000 will be done</td>
</tr>
<tr>
<td>14</td>
<td><strong>Training/capacity building to staffs</strong></td>
<td>existing</td>
<td>Yearly additional trainings on environment health and safety should be given</td>
</tr>
<tr>
<td>15</td>
<td><strong>Community Support programme</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Health Awareness/campaigning</td>
<td>Good number of health awareness campaigns conducted by hospital &amp; students but very less in collaboration with community</td>
<td>Additional awareness campaigns should be done in collaboration with community</td>
</tr>
<tr>
<td></td>
<td>Support to local clubs</td>
<td>Support to local development can be seen but additional support can be done</td>
<td>Can contribute more on local development</td>
</tr>
<tr>
<td>16</td>
<td><strong>Air pollution control</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td><strong>Occupational health and safety measures</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Purchasing of Ordinary gloves</td>
<td>Staffs working in health waste management, laundry management and others working with cleanliness/sanitation were found not using gloves, mask and apron</td>
<td>Additional safety gears should be purchased for enough availability to staffs</td>
</tr>
<tr>
<td></td>
<td>Purchasing of Sterilized Gloves</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Purchasing of Masks</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Purchasing of Plastic</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Environmental Impact Assessment aims to enhance the beneficial impacts and mitigate the adverse impacts as identified and predicted above. The benefit augmentation measures for beneficial impacts and the adverse impact mitigation measures for adverse impacts have been presented in the following sub-sections:

### 7.2 BENEFIT AUGMENTATION MEASURES FOR BENEFICIAL IMPACTS

The measures that can enhance and augment the identified beneficial impacts are presented below. Under the operational stage, they have been classified into physical, biological, socio-economic and cultural impacts.

The following table summarizes the benefit augmentation measures for respective beneficial impacts:

<table>
<thead>
<tr>
<th>Likely impacts</th>
<th>Benefit Augmentation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operation Stage of Medical College</strong></td>
<td></td>
</tr>
<tr>
<td>Boost in local economy- regular operation of the proposed project will create opportunity for related trade and business. Moreover, the project will pay revenue to government through metropolitan which will ultimately increase the local economy</td>
<td></td>
</tr>
<tr>
<td>• Give priority for the consumption of locally produced daily food and non-food items</td>
<td></td>
</tr>
<tr>
<td>• Encourage local people for establishing Pharmacy, Lodges, Restaurants business in the medical college area.</td>
<td></td>
</tr>
<tr>
<td>• Facilitate local business owners to be vendor in supplying the goods and services.</td>
<td></td>
</tr>
<tr>
<td>• Coordinate with local shops.</td>
<td></td>
</tr>
<tr>
<td>Health care opportunities for local people and outsiders</td>
<td>• Local qualified and good students are getting chance to study medical education on various subjects including MBBS.</td>
</tr>
<tr>
<td></td>
<td>• MCOMS provides some scholarship to batch toppers and good national students. As per condition stipulated by the Government, 10 percent full scholarship has been allocated.</td>
</tr>
<tr>
<td></td>
<td>• Health trainings, internship and exchange programs will be launched.</td>
</tr>
</tbody>
</table>
### Likely impacts | Benefit Augmentation Measures
---|---
Employment opportunity to locals | • Provide opportunities to work together with qualified and experienced technical and managerial personnel  
• Give priority to locals during the recruitment  
• To augment the skill enhancement, conduct some on-the-job training program for local people especially in operation of the advance medical equipment and testing procedures  
• Provide opportunities of advance training, which helps to enhance the skill and technical know-how of local

### 7.3 MITIGATION MEASURES TO ADVERSE IMPACTS

The mitigation measures for all the adverse impacts from the construction and operation of the MCOMS have been presented below. These measures in operational stage have been classified under the types of impacts as physical, biological, socio-economic and cultural impacts. The proponent commits to implement all of these mitigation measures.

#### Table 23: Mitigation Measures for Adverse Impacts

<table>
<thead>
<tr>
<th>Likely impacts</th>
<th>Operational Phase (Medical College)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Environment</td>
<td></td>
</tr>
</tbody>
</table>
| Issue of solid waste management | • Reassess the location and need for additional dustbin as per the volume & type of waste generated in each ward  
• Label dustbin in line with Nepal government HCWM guideline .2014  
• Allocation of enough color indicated dustbins at various places differentiating for biodegradable, non-biodegradable, papers, plastics and risk waste.  
• Inhouse training to newly appointed staffs on the Healthcare and General waste management.  
• Instruct patients, visitors to throw waste in dustbin according to its type as indicated.  
• Coordination with solid waste management authority (for timely transfer of collected solid waste to landfill site).  
• National Health Care Waste Management Guidelines has to be followed to manage the medical wastes.  
• Detail study will be done on feasible method for treatment and disposal of high risk pathological and cytotoxic waste. And treatment and disposal will be done following the study.  
• An expert/staff on healthcare waste management should be hired to overall management of HCW.  
• Use of plastics below 30 microns will be restricted and hospital should follow of plastic ban regulation 2068 |
<table>
<thead>
<tr>
<th>Likely impacts</th>
<th>Adverse Mitigation Measures</th>
</tr>
</thead>
</table>
| • Infectious wastes which are not recommended for autoclave will be incinerated. Incinerator will be used Following Nepal government guideline.  
• Biogas plant can be installed  
• Additional mitigation measures of HCWM that needs to be strictly followed is mentioned in ANNEX G |                                                                                             |
| Issue of liquid waste management                  | • The waste water, semi liquid waste and solid waste generated during the operation of the proposed project will not be discharged directly to any water bodies or surface water without treatment.  
• Sanitary wastewater & chemically contaminated wastewater will be treated as required to meet the National Effluent Standard  
• Sewage treatment plant will be regularly maintained.  
• Appoint technically qualified staff for Operation & Maintenance of ETP plant  
• Check the treated effluent quality on regular basis  
• Regularly check manholes and clean surface drains periodically  
• Ensure not to obstruct natural drainage system  
• Adhere with national planning rules & regulations and approved plans |                                                                                             |
| Issue regarding possible burning of hospital wastes | • Hospital Waste only to be autoclaved before its disposal  
• Reduce the use of plastics and recycle as possible |                                                                                             |
| Issue of energy fulfillment for the hospital operation | • Effective use of electricity  
• Renewable Energy source such as Solar Energy |                                                                                             |
| Issue of disaster risk reduction (Earthquake, fire hazards, lightning, electrocution) in hospital | • Provision of emergency exits in design of buildings  
• Fire safety training and drills practised to all hospital and medical school staffs  
• Regular maintenance of Smoke/fire alarm  
• Seismic vulnerability assessment following national building code as per need |                                                                                             |
| Chemical Environment                              |                                                                                             |
| Radiation hazard from radiological equipments      | • Authorization for the use of such equipments.  
• Separate outfits for indirect radiation exposing staffs |                                                                                             |
| Chemical and heavy metal wastes and effluent       | • Careful handling and storage of hazardous chemicals in designated locations.  
• Authorization for the use of such chemicals.  
• Separate outfits for the lab workers, and other staffs dealing with chemicals.  
• Proper Disposal of faeces and other waste |                                                                                             |
| Contamination of ground water                      | • Use of native plants in landscape which don't need much water or fertilizer  
• Well maintained Septic System |                                                                                             |
### Likely impacts

<table>
<thead>
<tr>
<th>Air pollution due to handling of chemicals and burning of waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Proper disposal of Garbages and hazardous chemicals</td>
</tr>
<tr>
<td>• Proper disposal of medicines</td>
</tr>
<tr>
<td>• Greenbelt development which can filter the toxic air pollutants</td>
</tr>
<tr>
<td>• Maintainence of Generators</td>
</tr>
</tbody>
</table>

### Biological Environment

<table>
<thead>
<tr>
<th>Greenery maintenance and protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Use of Native plants for greenery maintenance</td>
</tr>
<tr>
<td>• Maintenance of green area</td>
</tr>
<tr>
<td>• Proper treatment of the sewage before disposing into the river.</td>
</tr>
</tbody>
</table>

### Socio-economic and Cultural Environment

<table>
<thead>
<tr>
<th>Issue of Occupational health and safety of the workers</th>
</tr>
</thead>
<tbody>
<tr>
<td>• MCOMS will instruct the contractors not to employ child labor and follow the labor laws.</td>
</tr>
<tr>
<td>• The management of the medical college is very much committed to health and safety issues. Safety first will be the slogan of the project. All workers associated with the construction work will be instructed and trained on health and safety related activities and issues including Emergency Preparedness Plan.</td>
</tr>
<tr>
<td>• Provide helmet and masks for each worker.</td>
</tr>
<tr>
<td>• Keep First-Aid-Kits at appropriate places.</td>
</tr>
<tr>
<td>• Organize health &amp; safety awareness programs for workers.</td>
</tr>
<tr>
<td>• Adhere with labor act and regulations.</td>
</tr>
<tr>
<td>• Do not allow alcohol consumption at project site and coordinate with local police.</td>
</tr>
<tr>
<td>• Organize interaction between local people and employees to maintain good relationship so that no obstruction occurs in future days.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Food safety issues for patient, visitors and staffs</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Maintain hygiene in the kitchen area (Daily cleaning, storage of food in designated locations).</td>
</tr>
<tr>
<td>• Food hygine and sanitation awareness banners to be displayed at visible places</td>
</tr>
<tr>
<td>• Space for the canteen is allocated far from radiation, laboratory, morgue room &amp; waste management units.</td>
</tr>
<tr>
<td>• Provision of necessary sanitation facilities like tissue rolls, soaps, water etc.</td>
</tr>
<tr>
<td>• Timely hygine monitoring check will be done from hospital authority</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Issue of health and sanitation in and around the vicinity</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Provision of Morgue rooms and Refrigerating corpses to avoid foul smell and delay decomposition for dead bodies.</td>
</tr>
<tr>
<td>• Separate outfits for indirect radiation exposing staffs</td>
</tr>
<tr>
<td>• Cleaning and Disinfecting of the hospital area</td>
</tr>
<tr>
<td>• Routine maintenance of sterilizing equipments.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Issues of Grievances</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Installation of Suggestion box in the various places</td>
</tr>
<tr>
<td>Likely impacts</td>
</tr>
<tr>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>• Regular Interaction program with the patients, visitors, staffs and students by the hospital committee themselves</td>
</tr>
</tbody>
</table>
| Pressure on community resources and infrastructure | • Coordinate with local bus service providers for local transportation system to the hospital.  
• A separate electricity connection has already issued by the hospital which will not create extra pressure of electricity demand.  
• Three boles within the hospital is fulfilling water demand  
• Allocation of enough parking area |
| Law and order situation                    | • MCOMS will all the time try to have harmonious relation and amicable settlement of any conflict whenever they arise.  
• MCOMS will coordinate with local authorities for settlement of such problems. |

### 7.4 COST ESTIMATION FOR THE PROPOSED MITIGATION MEASURES

Budget is needed to implement mitigation measures. The management considers all such expenses as necessary investment and is fully committed to implement all the beneficial impacts augmenting as well as adverse impacts mitigating measures. Some expenses can be termed as fixed investment and others will be classified into annual expenditures. A large number of mitigation measures are relating to civil construction or general operation and the construction cost or the operation cost will incorporate these necessary costs. Some of the examples of such measures are:

- Design and construction of waste water treatment plant
- Upgrade the existing medical solid waste management unit
- Timely maintenance of equipment and vehicle
- Emergency preparedness training
- Emergency Exit
- Feasibility study and installation of rainwater harvesting

These costs have not been included here; similarly, some of the measures do not require any separate cost. The examples are:

- Priority to be given for local people
- Facilitating local business and local purchase
- Providing opportunities to young professionals work with experts
- Careful handling of dusty materials
- Not allowing to use horn
- Proper scheduling of vehicles
- Discounts to locals and senior citizens

MCOMS is committed to implement the mitigation measures recommended in this EIA report and any other unforeseen issues that may arise during operation phase.
The following Table 24 gives the breakdown of the existing mitigation cost being spent at present and additional mitigation cost proposed for the future.
Table 24: Estimated Cost for Mitigation Measures

<table>
<thead>
<tr>
<th>S.N</th>
<th>Detail</th>
<th>Existing MM cost details</th>
<th>Additional MM cost details</th>
<th>Total cost</th>
<th>Frequency of cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Quantity</td>
<td>Unit</td>
<td>Rate</td>
<td>Existing</td>
</tr>
<tr>
<td>1</td>
<td><strong>Greenery And Landscape Management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a</td>
<td>Greenery</td>
<td>177500</td>
<td>sq.ft.</td>
<td>40</td>
<td>71,00,000</td>
</tr>
<tr>
<td>b</td>
<td>Proposed Greenery</td>
<td></td>
<td></td>
<td>40</td>
<td>0</td>
</tr>
<tr>
<td>c</td>
<td>Human Resource</td>
<td>7</td>
<td>no</td>
<td>16,000</td>
<td>112,000</td>
</tr>
<tr>
<td>d</td>
<td>Flowers &amp; Plant</td>
<td>350</td>
<td>no</td>
<td>50</td>
<td>17,500</td>
</tr>
<tr>
<td>e</td>
<td>Tools( Grass cutter)</td>
<td>1</td>
<td>no</td>
<td>2,00,000</td>
<td>2,00,000</td>
</tr>
<tr>
<td>f</td>
<td>Fuel and others</td>
<td></td>
<td></td>
<td></td>
<td>20,000</td>
</tr>
<tr>
<td>2</td>
<td><strong>Traffic management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a</td>
<td>Staff</td>
<td>2</td>
<td>no</td>
<td>16,000</td>
<td>32,000</td>
</tr>
<tr>
<td>b</td>
<td>Signal</td>
<td>20</td>
<td>no</td>
<td>400</td>
<td>8,000</td>
</tr>
<tr>
<td>c</td>
<td>Health Awareness &amp; Coordination activities</td>
<td>3</td>
<td>no</td>
<td>5,000</td>
<td>15,000</td>
</tr>
<tr>
<td>3</td>
<td><strong>Improvement of Existing Water supply system</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a</td>
<td>water tank/ Piping/fitting/water treatment plant</td>
<td>L.S</td>
<td></td>
<td></td>
<td>54,000,000</td>
</tr>
<tr>
<td>b</td>
<td>Monitoring Staff</td>
<td>6</td>
<td>no</td>
<td>16,000</td>
<td>96,000</td>
</tr>
<tr>
<td>c</td>
<td>Media Change</td>
<td>3</td>
<td>lot</td>
<td>50,000</td>
<td>150,000</td>
</tr>
<tr>
<td>d</td>
<td>Test Report</td>
<td>4</td>
<td>no</td>
<td>1,500</td>
<td>6,000</td>
</tr>
<tr>
<td>4</td>
<td><strong>Improvement/ upgrading of sewerage system/ sewage treatment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a</td>
<td>Upgrading sewerage system</td>
<td>L.S</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>purchasing of Chemicals</td>
<td>L.S</td>
<td></td>
<td></td>
<td>60,000</td>
</tr>
<tr>
<td>C</td>
<td>construction of ETP</td>
<td>1</td>
<td>No</td>
<td></td>
<td>20,000,000</td>
</tr>
<tr>
<td>5</td>
<td><strong>Health Care Waste Management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Staff (for segregation of waste)</td>
<td>4</td>
<td>no</td>
<td>16,000</td>
<td>64,000</td>
</tr>
<tr>
<td>B</td>
<td>Transportation charge to Municipality</td>
<td>45,000/m</td>
<td></td>
<td></td>
<td>540,000</td>
</tr>
<tr>
<td>C</td>
<td>Purchasing of Auto clave</td>
<td>1</td>
<td>no</td>
<td></td>
<td>850,000</td>
</tr>
<tr>
<td>D</td>
<td>Segregation buckets/needle cutter</td>
<td>L.S</td>
<td></td>
<td></td>
<td>1,185,000</td>
</tr>
<tr>
<td>S.N</td>
<td>Detail</td>
<td>Existing MM cost details</td>
<td>Additional MM cost</td>
<td>Total cost</td>
<td>Frequency of cost</td>
</tr>
<tr>
<td>-----</td>
<td>------------------------------------------------------------------------</td>
<td>--------------------------</td>
<td>--------------------</td>
<td>------------</td>
<td>-------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quantity</td>
<td>Unit</td>
<td>Rate</td>
<td>Existing</td>
</tr>
<tr>
<td>E</td>
<td>Trolley</td>
<td></td>
<td>L.S</td>
<td>540,000</td>
<td>180,000</td>
</tr>
<tr>
<td>F</td>
<td>Pamphlete/brochure/sticker/flex</td>
<td></td>
<td>L.S</td>
<td>75,000</td>
<td>45,000</td>
</tr>
<tr>
<td>G</td>
<td>Garbage bag (large)</td>
<td></td>
<td>L.S</td>
<td>1,768,356</td>
<td>176,835</td>
</tr>
<tr>
<td>H</td>
<td>Plastic bag (small)</td>
<td></td>
<td>L.S</td>
<td>477,990</td>
<td>47,799</td>
</tr>
<tr>
<td></td>
<td><strong>6 Noise pollution control</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Noise Pollution( installation of warning signboards to control noise)</td>
<td></td>
<td>L.S</td>
<td>10,000</td>
<td>10,000</td>
</tr>
<tr>
<td>B</td>
<td>Purchasing of sound proof generator</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>7 Construction of separate unit for Dead body management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Purchasing of Ordinary gloves</td>
<td></td>
<td>L.S</td>
<td>2,700,000</td>
<td>2,700,000</td>
</tr>
<tr>
<td>D</td>
<td>Purchasing of Sterilized Gloves</td>
<td></td>
<td>L.S</td>
<td>4,680,000</td>
<td>4,680,000</td>
</tr>
<tr>
<td>E</td>
<td>Purchasing of Masks</td>
<td></td>
<td>L.S</td>
<td>495,000</td>
<td>495,000</td>
</tr>
<tr>
<td>F</td>
<td>Purchasing of Plastic apron</td>
<td></td>
<td>L.S</td>
<td>30,900</td>
<td>30,900</td>
</tr>
<tr>
<td></td>
<td><strong>10 cleanliness/sanitation/disinfection/laundary management activities</strong></td>
<td></td>
<td>L.S</td>
<td>10,800,000</td>
<td>10,800,000</td>
</tr>
<tr>
<td></td>
<td><strong>11 Community Support programme</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Health Awareness/campaigning</td>
<td></td>
<td>L.S</td>
<td>3,000,000</td>
<td>1,000,000</td>
</tr>
<tr>
<td>B</td>
<td>Support to local clubs/</td>
<td></td>
<td>L.S</td>
<td>1,000,000</td>
<td>1,000,000</td>
</tr>
<tr>
<td></td>
<td><strong>12 Support to local area development ( Road drainage, sewerage)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Public Road maintenance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Training/capacity building to staffs</td>
<td></td>
<td>L.S</td>
<td>500,000</td>
<td>500,000</td>
</tr>
<tr>
<td>C</td>
<td>Fire safety system (fire hydrant)</td>
<td></td>
<td>L.S</td>
<td>500,000</td>
<td>500,000</td>
</tr>
<tr>
<td></td>
<td><strong>14 Emergency response system</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Provision of Emergency exit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Seismic vulnerability assessment including soil test</td>
<td></td>
<td>L.S</td>
<td>2,000,000</td>
<td>2,000,000</td>
</tr>
<tr>
<td>C</td>
<td>Fire safety system (fire hydrant)</td>
<td></td>
<td>L.S</td>
<td>500,000</td>
<td>500,000</td>
</tr>
<tr>
<td>S.N</td>
<td>Detail</td>
<td>Quantity</td>
<td>Unit</td>
<td>Rate</td>
<td>Existing</td>
</tr>
<tr>
<td>-----</td>
<td>------------------------------------------------------------------------</td>
<td>----------</td>
<td>------</td>
<td>------</td>
<td>----------</td>
</tr>
<tr>
<td>D</td>
<td>Fire extinguisher</td>
<td></td>
<td>L.S</td>
<td>400,000</td>
<td>200,000</td>
</tr>
<tr>
<td>E</td>
<td>Drill exercise as a part of emergency response mechanism</td>
<td></td>
<td>L.S</td>
<td>100,000</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>solar heating and solar lighting</td>
<td></td>
<td></td>
<td>2,000,000</td>
<td>20,000,000</td>
</tr>
<tr>
<td>18</td>
<td>installation LED Light</td>
<td></td>
<td></td>
<td>700,000</td>
<td>800,000</td>
</tr>
<tr>
<td>19</td>
<td>Underground wiring</td>
<td></td>
<td></td>
<td>inbuilt in design</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>support to roadside plantation</td>
<td></td>
<td></td>
<td>1,000,000</td>
<td>1,000,000</td>
</tr>
<tr>
<td></td>
<td><strong>Total mitigation cost</strong></td>
<td></td>
<td></td>
<td>113,732,746</td>
<td>34,099,984</td>
</tr>
</tbody>
</table>
CHAPTER 8: REVIEW OF POLICY AND LEGAL PROVISIONS

The literatures on the following matter were reviewed and pertinent information to the context of MCOMS was incorporated/ referred in the report during the course of preparation of EIA report:

8.1 Constitution of Nepal, 2072 B.S. (2015 AD)
Clause 30 Right to clean environment:
(1) Every citizen shall have the right to live in a clean and healthy environment.
(2) The victim shall have the right to obtain compensation, in accordance with law, for any injury caused from environmental pollution or degradation.
(3) This Article shall not be deemed to prevent the making of necessary legal provisions for a proper balance between the environment and development, in development works of the nation.

Clause 35: Right relating to health:
(1) Every citizen shall have the right to free basic health services from the State, and no one shall be deprived of emergency health services.

(3) Every citizen shall have equal access to health services.
(4) Every citizen shall have the right of access to clean drinking water

Clause 51: (f)(2) To develop balanced, environment friendly, quality and sustainable physical infrastructures, while according priority to the regions lagging behind from development perspective.

8.2 Plan and Policies

National Health Policy 2071 B.S.
The National Health Policy was adopted in 1991 (2048 BS) to bring about improvement in the health conditions of the people of Nepal. The primary objective of the National Health Policy is to extend the primary health care system to the rural population so that they benefit from modern medical facilities and trained health care providers. In line with the policy; this project has provision to cover the areas dealt under this policy. Implementation of this project would especially address the following areas among the 14 areas mentioned in the policy document.

- Programs that directly help reduce infant and child mortality rates
- With well-equipped 500 bed hospital, curative health services will be made available to the rural population
- The technically competent human resources will be developed for important health facilities.
- Health research will be encouraged for better management of health services.
The Ministry of Health, GoN, developed a 20 year Second Long-Term Health Plan (SLTHP) from 2054 to 2074 (1997-2017) and the aim of the SLTHP is to guide health sector development in the improvement of the health for the population; particularly those, whose healthcare needs are not often met (MOH, 1987)

The SLTHP addresses disparities in healthcare, assuring gender sensitivity and equitable community access to quality healthcare services.

The SLTHP envisions a healthcare system with equitable access and quality services in both rural and urban areas. The system would encompass the concepts of sustainability, full community participation, decentralization, gender sensitivity, effective and efficient management, and private and NGO participation.

Nepal Health Sector Program-Implementation Plan (2004-2009) has also taken consideration to function in line with and to contribute in achieving the objectives mentioned in the SLTHP. Similarly, Nepal Health Sector Implementation Plan (NHSP-IP) has been reviewed in the course of preparing this EIA report. This medical college teaching hospital will also contribute to the goals as indicated in the NHSP-IP (MOH, 2004a)

Fourteenth Three Year Plan, 2073-2076B.S.
The fourteenth plan has identified EIA as a priority area, as it emphasizes on environmental monitoring of the project that have undergone EIA process. The Plan focuses on the need for setting up national environmental standards with strategy of internalizing environmental management into the development programs. The Plan has also realized to carryout Strategic Environmental Assessment (SEA) with the long-term policy of promoting environmental governance. The Plan emphasizes on the local participation in environmental conservation, as envisaged in the Local Self Governance Act, 2055, through the local bodies, make them responsible and capable to manage local natural resources.

The long-term vision of environmental management is to create a clean and healthy environment through effective environmental management and to achieve sustainable development through the wise use of natural resources. By integrating environmental aspects in social and economic development programs through Environmental Assessment (EA) system, improvements will be made in the quality of environment by means of environment friendly development. Road projects will be formulated and constructed based on methods that optimally utilize the local skill and resources and generate employment opportunities.

8.3 Acts and Regulation
Environmental Impact Assessment of Manipal College of Medical Sciences

**Environment Protection Act, 2053 B.S. (1997 AD) and Environment Protection Regulation, 2054 B.S. (1997 AD) and its amendments**

The Act requires prescribed developmental projects to carry out environmental impact assessment and such projects can not be implemented without approval from the Ministry of Forests and Environment. The proponent is required to submit proposal with the report and the Ministry has to grant approval of the proposal after opinions and suggestions by the general-public and by an expert committee formed by the Ministry. The Act also has the provision such that nobody can create pollution beyond prescribed limits or standards; or nobody can cause significant adverse impacts to the environment to safeguard to public life and health. The Act also has the provisions of environmental inspectors, protection of national heritage, protection area, compensation and punishments (GoN, 2058). These provisions of the Act are directly related to the proposed teaching hospital and research center and hence these provisions have been considered in the design and proposed implementation.

Rule 4 of the EPR, 1997 (along with the amendment of 1990) empowers the Ministry of Ministry of Forests and Environment to scrutinize and or/approve the Scoping Reports of all “prescribed” proposals, which requires an EIA study. The Proponents has published 15-day public notice in national daily newspaper “Gorkhapatra” inviting the reaction and comments from the concerned and interested persons; obtained approval of the scooping report and the terms of reference; and carried out the EIA study in line with the provisions of the regulations (GoN, 2058).

**Aquatic Animal Protection Act, 2017**

The Aquatic Animals Protection Act, 2017 provides for legislative protection of habitat of aquatic animals. Section 3 confirms penalty punishable to any party for spilling poisonous, noxious or explosive materials into a water source or destroying any dam, bridge or water system with the intent of catching or killing aquatic life. It has been in effect since 2039; yet both noxious and explosive materials are increasingly used in waterbodies throughout Nepal. Under Section 4, the ogovernment is empowered to prohibit catching, killing and harming of certain kinds of aquatic animals by notification in the Nepal Gazette.

**Building Act, 2055 B.S (1998 AD) and its regulation, 2066 B.S. (2009 AD)**

Building Act, 2055BS has the necessary provisions for the regulation of building construction works in order to protect building against earthquake, fire and other natural calamities, to the extent possible. It has the provisions relating to design and approval of design/map of building, which states that "Any person, body or government body shall, in making a building, build it in consonance with the standards set forth in the building code. In so making a building, the building shall be built under the supervision of a designer or his/her representative, engineer or architect whose rank is at least the same as that of the designer, engineer or architect who has certified the map and design of that building.
**Industrial Enterprise Act, 2042 B.S (1992AD)**

Industrial Enterprise Act has formulated with the aim of speedy economic development of the country. It is expedient to facilitate the employment opportunities by creating an environment of industrial investment which may be more facilitative, easy and encouraging; to increase the productivity, to encourage the private sector to greater extent and to maintain the comfort and economic interest of the people in general.

The hospital under this act is kept under service industry. The act also highlights the requirement of permission for the extention and diversification of environmentally sensitive industries. It also encourages the industrial enterprises to minimize harmful effects on the environment by providing the financial incentives.

**Labor Act, 2074 B.S. and its Regulation, 2075 B.S.**

**Labor Act, 2074 B.S.**

Local Government Operation Act, 2074, formulated in accordance with the spirit of Constitution of Nepal, grants the local level units legislative, executive and judicial rights. The local governments now have authority to manage teachers, staff and education up to the basic level—Grade 8—and oversee basic medical care. The local legislature has the power to formulate local laws in line with the Act drafts provided by the Centre, while the local judiciary can decide cases related to irrigation, daily wages and pastures, among others. The smallest units among three tiers of the government can set up their own city police force, issue land ownership certificates and collect revenue on property, besides registering births, deaths and marriages. They are also allowed to levy the taxes on house rent, entertainment, property, tourism, among others, in compliance with the tax laws of the Central and Provincial governments.

**Labor Rules, 2075 (2018)**

The Government of Nepal (“GoN”) has framed the Labor Rules, 2075 by exercising the power conferred to it under section 184 of the Labor Act, 2074. The Labor Rules, 2075 has outlined following criteria:

Labor Rule 3 has set criteria for determining whether employment is regular employment or not. Pursuant to the Rule 2 the issue as to whether or not the employment is of regular nature or not is determined on the basis of whether not a) the employment requires continuity upon expiry of the term and, it is required to continue whether or not another Employee is immediately required, and b) the Employee has worked on a regular basis for a period more than one year in the case if no term of employment has been specified.

Section 11 (3) of the Labor Act for the employment contract and matters to be covered under the employment contract. Section 11 (3) of the Labor Act requires the employment contract to include a) remuneration, benefits, and c) terms of the Employee. Likewise, nature of employment, primary work of the Employee & his/her position, statement that Employees’ Service Rule will be integral part, d) date, time, place of contract and its effective date, & e) terms and conditions related to work or service of Employee are covered under Employment contract.
The Labor Rules has also specified the criteria for lay off. The notice of layoff should cover reason of lay off, & duration, details of employee to be laid off and information that mentions payment of half remuneration during lay off.

Labor Rules has also provided flexibility to Employers to determine the working hours. The Employer can determine the work hours on the basis of the nature of work of entity, however notice should be given to all employees regarding work hours. Labor Rule also provides that the Employer may put Employee to work on rotation based on nature of its work. Likewise, Labor Rules has specified that Employer should provide additional rest period certain female Employees such as who has 3 years of breast feeding, & who is pregnant.

Likewise, Labor Rules has specified criteria for payment and salary deduction, provident fund & gratuity, and outsourcing. Labor Rules has also stated the requirement of occupational health and safety, workplace safety.

**Local Government Operation Act, 2074 B.S.**
The Act follows the spirit of decentralization and strengthening the local government agencies. It empowers the local bodies for the conservation of soil, forest and natural resources and implementation of environmental conservation activities.

**Medical Council Act, 2020 B.S. (1964 AD) and its Regulations 2070 B.S.**
This Act was formulated to manage qualification of Medical practitioner and also for the registration of Medical practitioner qualified in modern medicine for the scientific utilization of modern medicine throughout Nepal. The main functions and duties of Nepal Medical Council shall be as given belows:

- To give recognition as prescribed to the Medical College which provides or cause to provide study, teaching and training in medical science.
- To make recommendation for cancellation of registration and approval in cases where it has been found not compliance at the time of evaluation and review of prescribed policy of the curriculum, terms of admission and examination system and other infrastructures and other matters of standards of the Medical College which provides or cause to provide study, teaching and training in medical science.
- To determine policy as required for smooth operation of the medical profession.
- To issue registration license by determining qualification of the Medical practitioner and conducting prescribed Licensing Examination for the qualified Medical practitioner.
- To prepare code of conduct of the Medical practitioner as prescribed and remove the name of a Medical practitioner from the Registration book after taking actions as prescribed against the Medical practitioner who has breached such a code of conduct.

The major provisions of the Public Roads Act, 1974 are:
- Prescribes rules for planned road construction; regulating road width and boundaries, within which no houses can be built; and
- Maintains road environment through plantation along public roads.
- GoN agencies and public needs prior approval from Department of Roads to carry out work on roads and road boundaries.

**Solid Waste Management Act, 2068 B.S.**
Article 4 rests the responsibility of the solid waste management under the prescribed standards with the persons or institution that has generated the waste; Article 5 mandates reduction of the waste at source and deciding to dispose the disposable (biodegradable? Organic?) solid waste within their own area or making arrangement for the reuse thereof and discharging the remaining solid waste thereafter; Article 9 make the institution responsible to transport the solid waste to the waste disposal facility; Article 18 provisions for the service for the solid waste management; Article 21 make local body responsible for the monitoring of solid waste management; Article 38 stipulates discharge of solid waste without the consent of the local body as an offence and Article 39 provisions for the punishment /penalty in case of offense.

**Solid Waste Management Regulations, 2070 B.S.**
Solid Waste Management Rules has provided authority to local bodies for the segregation, transportation and disposal of solid waste as well as operation of sanitary landfill site. Local bodies may also empower the company, organization and agency, producing solid wastes, for segregating, reducing the solid wastes at its source, reuse and recycling use solid wastes and mobilize community and non-governmental organization for creating awareness for the management of the solid waste. Local bodies have also the authority to determine service charge for solid waste management.

**Soil and Watershed Conservation Act, 2039 B.S. (1982 AD)**
Soil and Watershed Conservation Act is formulated to prevent or save any area from being destroyed from natural calamities such as flood, landslide and soil-erosion and keep the volume and flow of water in a normal condition or keep on maintaining cleanliness by preventing the flow of water from being muddy.

The Act permit to carry out by a conservation officer to maintain the soil fertility and the cleanliness of water and environment in a balanced manner and carry out such other soil and watershed conservation related acts as prescribed by Government of Nepal.

**Water Resources Act, 2049 B.S (1992 AD)**
Water Resource Act is an umbrella act governing water resource management. It declares the order of priority of water use; vests ownership of water in the state; prohibits water pollution; and provides for the formation of Water User Association and system of licensing.

Article 3 stipulates the water resource right to the Government; Article 4 prohibits use of water resources without obtaining license except the specified uses under the Act; Article
establish the priority order on the utilization of water resource; Article 8 stipulates procedure for water resource licensing; Article 16 empowers government to utilize the water resources and acquisition of others land and property for the development of water resource as stipulated in the Act; Article 18 stipulates the right of the government to fix the quality standards of water; Article 19 prohibits pollution of water resource above prescribed pollution tolerance limits; Article 20 stipulates not to cause harm and adverse effect on environment while developing the water related projects.

**Good Governance (Management and Operation) Act, 2064 B.S. (2008 AD)**

The act highlights the responsibility of the administration for the effective functioning of the administrative system of the country. It establishes general provisions regarding the operation (execution) of National Governance. Functions to be carried out at different levels by the Government of Nepal shall be administrative functions at central, regional, zonal, district, and local level to maintain good governance within the country.

### 8.4 Guidelines

**National EIA Guidelines, 2050 B.S (1993 AD)**

GoN has developed and adopted National EIA guidelines in 1993, under which projects and programs are categorized as either requiring Initial Environmental Examination (IEE) or Environmental Impact Assessment (EIA). Environmental Protection Act, 1997 and the Environmental Protection Regulation, 1997, were brought into force aiming at mainstreaming of the integration of environmental aspects in development projects and programs.

**Health Care Waste Management Guidelines, 2071 B.S. (2014 AD) DoHS**

This Guideline deals with the health care waste categorization (general waste and medical waste) along with its impact on health and environment, treatment process and disposal of health care waste.

**National Environmental Health Impact Assessment (EHIA) Guidelines, 2059 B.S.(2002 AD)**

The NEHIAG for development projects deals with expanding the current EIA with integration of a more definite and comprehensive procedure for assessing the impact of development projects in the health condition of the people in the community and in the workplace. This guideline intends to facilitate the preparation and implementation of Environmental Health Impact Assessment (EHIA). For proposals not required to conduct a detailed EHIA on their proposed projects it guides for the preparation of Health and Safety Management Plan.

### 8.5 Standards

**National Air Quality Standards 2069 B.S.**
It limits the ambient air quality parameter around the construction sites. The threshold of air quality is provided in the Annex.

**National Drinking Water Quality Standard, 2062 B.S**

It provides the standard for quality of the drinking water supply in the project camps and construction sites. The threshold of water quality is provided in the Annex.

### 8.6 Conventions

**Basel Convention, 1992**

The Basel Convention concerns with the trans-boundary movements of hazardous waste and it is applicable to hospital waste as well. The convention has been signed by more than 100 countries. It has mandatory provisions that all the parties should accept the principle that the only legitimate trans-boundary shipments of hazardous waste or exports from countries that lack the facilities and or expertise to dispose safely of certain wastes to other countries. The importing countries should have both facilities and expertise. Exported wastes should be labeled according to the UN recommended standards. The Rotterdam convention on the Prior Informed Consent (PIC) procedure for Certain Hazardous Chemical and pesticides in Intermediate Trade adopted in 1998 obliges information of other parties and possible listing under the convention.

**The Stockholm Convention on persistent organic pollutants, 2001**

Nepal has been a party to the Convention on Persistent Organic Pollutants, which was adopted in Stockholm in 2001 in response to the urgent need for global action to protect human health and the environment from POPs. The Stockholm Convention is a global treaty to protect human health and the environment from POPs. POPs are chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of living organisms, and are toxic to humans and wildlife. POPs circulate globally and can cause damage wherever they travel in implementing the Convention. Governments will take measures to eliminate or reduce the release of POPs into the environment. The convention seeks the elimination or restriction of production and use of all intentionally produced POPs; chemicals like Polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF), Hexachlorobenzene (HCB). Polychlorinated Biphenyls (PCB) are unintentionally formed and released from thermal process involving organic matter and chlorine and as a result of incomplete combustion pot or chemical reactions. Waste incinerators, including coinincinerators of municipal, hazardous medical waste of sewage sludge have the potential for comparatively high formation of release of these chemicals to the environment. The proposed hospital project should comply with the provisions of the Stockholm Convention. The article 6 of the convention obliges the hospital to develop strategies for identifying POPs wastes and to manage these in an environmentally sound manner. The POPs content of wastes is generally to be destroyed and irreversibly transformed. The ‘Polluters Pay Principle’ implies that all produces of hospital waste are legally and financially responsible for the safe and environmentally sound disposal of waste that
produce, this principle also attempts to assign liability to the party that causes damage, the ‘Precautionary Principle’ is a key principle governing health and safety protection. When the magnitude of a particular is uncertain, it should be assumed that this risk is significant, and measures to protect health and safety should be designed accordingly. The ‘Duty of Care Principle’ stipulates that any person handling or managing hazardous hospital waste or related equipment is ethically responsible for using the utmost care in that task. The ‘Proximity Principle’ recommends that treatment and disposal of hazardous hospital waste take place at the closest passively location to its source in order to minimize the risks involved in its transport. According to a similar principle, any hospital establishment should recycle or dispose of the waste it produces, inside its own territorial limits.

**Minamata Convention, 2017**

Nepal has signed the Minamata Convention in 10th October, 2013 which is a international treaty designed to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds. It contains, in support of this objective, provisions that relate to the entire life cycle of mercury, including controls and reductions across a range of products, processes and industries where mercury is used, released or emitted. The treaty also addresses the direct mining of mercury, its export and import, its safe storage and its disposal once as waste. Pinpointing populations at risk, boosting medical care and better training of health-care professionals in identifying and treating mercury-related effects will also result from implementing the Convention.

The Minamata Convention provides controls over a myriad of products containing mercury, the manufacture, import and export of which will be altogether prohibited by 2020, except where countries have requested an exemption for an initial 5-year period. These products include certain types of batteries, of lamps such as compact fluorescent lamps, of and relays, soaps and cosmetics, thermometers, and blood pressure devices. Dental fillings which use mercury amalgam are also regulated under the Convention, and their use must be phased down through a number of measures.

**Rotterdam Convention, 1998**

The convention creates legally binding obligations for the implementation of the Prior Informed Consent (PIC) procedure. It builds on the existing voluntary PIC procedure operated by UNEP and FAO since 1989 and considers experience gained during the implementation of the voluntary procedure (as set out in the London Guidelines for the Exchange of Information on Chemicals in International Trade and the FAO International Code of Conduct on the Distribution and Use of Pesticides).

The Convention establishes the principle that export of a chemical covered by the convention can only take place with the prior informed consent of the importing party. The convention establishes a "Prior Informed consent procedure." a means for formally obtaining and disseminating the decisions of importing countries as to whether they wish
to receive future shipments of specified chemicals and for ensuring compliance with these decisions by exporting countries.

The Convention initially covers 22 pesticides (including five severely hazardous pesticide formulations) and 5 industrial chemicals but many more are expected to be added in the future. The Conference of the Parties will decide on the inclusion of chemicals. The convention creates legally binding obligations for the implementation of the Prior Informed Consent (PIC) procedure. It builds on the existing voluntary PIC procedure operated by UNEP and FAO since 1989 and considers experience gained during the implementation of the voluntary procedure (as set out in the London Guidelines for the Exchange of Information on Chemicals in International Trade and the FAO International Code of Conduct on the Distribution and Use of Pesticides).

SAICM Convention 2006
The Strategic Approach to International Chemicals Management is a global policy framework to guide efforts to attain the goal set out in the Plan of Implementation of the World Summit on Sustainable Development that, by 2020, chemicals will be produced and used in ways that minimize significant adverse effects on human health and the environment. The involvement of all relevant sectors and stakeholders is central to achieving the objectives of the Overarching Policy Strategy of the Strategic Approach.

In its resolution II/8, the International Conference on Chemicals Management requested the Strategic Approach secretariat to develop, in consultation with the World Health Organization (WHO) and within available resources, a strategy for strengthening the engagement of the health sector in the implementation of the Strategic Approach. The present strategy represents the first time that the Conference has considered sector-specific approaches to attaining its objectives.
CHAPTER 9: ENVIRONMENTAL MONITORING AND AUDITING

9.1 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

Introduction to EMP
Environmental Management Plan (EMP) provides a basis for the implementation of Environmental Protection Measures (EPMs). This includes project monitoring, auditing, project management issues and the verification of predicted environmental impacts actually arising from the project implementation.

EMP has been prepared to implement the mitigation measures as given in the Section 7. The approved term of reference for EIA has required that EMP should comprises of implementation of the mitigation measures, environmental monitoring plan, framework for the environmental auditing, institutional arrangement for the implementation of EMPs and the estimated budget for implementing the EMP.

Planning

Stage for the implementation of environmental protection measures
The Environmental Protection Measures (EPMs) of MCOMS will be implemented during pre-construction or design phase, construction phase and operational and maintenance stages of the project. The implementation of the mitigation measures will be the responsibility of the proponent. All preparatory activities related to site clearance and design works will be completed during the pre-construction stages. The proponent will continue its environmental protection activities during post construction or the operational stages as well. The detailed plan is given in the next pages under Table 26 and Table 27. Necessary manpower and budget for their implementation are given in the following sub-sections.

Environmental Monitoring
Environmental monitoring is an integral part of the EIA report. The sub-section focuses on compliance and impact monitoring. Furthermore, the compliance monitoring is not related to effectiveness of the measures implemented rather it will only focus whether the implementation of EPMs have been taken or not.

An Environmental Monitoring Cell (EMC) will be established in MCOMS to collect reliable information on the air and noise quality in the college and hospital, hazardous medical waste disposal and possible contamination of water in the nearby drainage system, ultimately to the open canal passing through the adjacent areas. The unit will be responsible for giving accurate information regarding pollution levels.
### Table 25 Environmental Management Plan for Benefit Augmentation Measures

<table>
<thead>
<tr>
<th>Likely impacts</th>
<th>Benefit Augmenting measures</th>
<th>Schedule</th>
<th>Method</th>
<th>Location</th>
<th>Duration</th>
<th>Responsibility</th>
</tr>
</thead>
</table>
| Boost in local economy- regular operation of the proposed project will create opportunity for related trade and business. Moreover, the project will pay revenue to government through metropolitan which will ultimately increase the local economy | • Give priority for the consumption of locally produced daily food and non-food items  
• Encourage local people for establishing Pharmacy, Lodges, Restaurants business in the medical college area  
• Facilitate local business owners to be vendor in supplying the goods and services.  
• Coordinate with local shops | Operation Phase  | Observation, discussion  | IIZ  | Long Term  | Proponent   |
| Health care opportunities for local people and outsiders                     | • Local qualified and good students are getting chance to study medical education on various subjects including MBBS.  
• MCOMS provides some scholarship to batch toppers and good national students. As per condition stipulated by the Government, 10 percent full scholarship has been allocated.  
• Health trainings, internship and exchange programs will be launched | Operation Phase  | Observation, discussions  | DIZ  | Long Term  | Proponent   |
| Employment opportunity to locals                                             | • Provide opportunities to work together with qualified and experienced technical and managerial personnel  
• Give priority to locals during the recruitment  
• To augment the skill enhancement, | Operation Phase  | Observation, record books  | IIZ  | Long Term  | Proponent   |
<table>
<thead>
<tr>
<th>Likely impacts</th>
<th>Benefit Augmenting measures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>conduct some on-the-job training program for local people especially in operation of the advance medical equipment and testing procedures</td>
</tr>
<tr>
<td></td>
<td>• Provide opportunities of advance training, which helps to enhance the skill and technical know-how of local</td>
</tr>
</tbody>
</table>

Table 26 Environmental Management Plan for Adverse impacts Mitigation Measures

<table>
<thead>
<tr>
<th>Likely impacts</th>
<th>Adverse impact mitigation measures</th>
<th>Schedule</th>
<th>Method</th>
<th>Location</th>
<th>Duration</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Environment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Issue of solid waste management | • Reassess the location and need for additional dustbin as per the volume & type of waste generated in each ward  
• Label dustbin in line with Nepal government HCWM guideline ,2014  
• Allocation of enough color indicated dustbins at various places differentiating for biodegradable, non-biodegradable, papers, plastics and risk waste.  
• Inhouse training to newly appointed staffs on the Healthcare and General waste management.  
• Instruct patients, visitors to throw waste in dustbin according to its type as indicated.  
• Coordination with solid waste management authority (for timely transfer of collected solid waste to landfill site).  
• National Health Care Waste Management Guidelines has to be followed to manage the medical | Operation Phase | Observation, measurement | DIZ | Long Term | Proponent |

*Environmental Impact Assessment of*  
*Manipal College of Medical Sciences*
Likely impacts | Adverse impact mitigation measures
--- | ---
 | wastes.
 | • Detail study will be done on feasible method for treatment and disposal of high risk pathological and cytotoxic waste. And treatment and disposal will be done following the study.
 | • An expert/staff on healthcare waste management should be hired to overall management of HCW.
 | • Use of plastics below 30 microns will be restricted and hospital should follow of plastic ban regulation 2068
 | • Infectious wastes which are not recommended for autoclave will be incinerated. Incinerator will be used Following Nepal government guideline.
 | • Biogas plant can be installed
 | • Additional mitigation measures of HCWM that needs to be strictly followed is mentioned in **ANNEX G**

| Issue of liquid waste management |
---|---|
 | • The waste water, semi liquid waste and solid waste generated during the operation of the proposed project will not be discharged directly to any water bodies or surface water without treatment.
 | • Sanitary wastewater & chemically contaminated wastewater will be treated as required to meet the National Effluent Standard
 | • Sewage treatment plant will be regularly maintained.

| Schedule | Method | Location | Duration | Responsibility |
---|---|---|---|---|
<p>| Observation Phase | Observation, records | IIZ | Long Term | Proponent |</p>
<table>
<thead>
<tr>
<th>Likely impacts</th>
<th>Adverse impact mitigation measures</th>
<th>Schedule</th>
<th>Method</th>
<th>Location</th>
<th>Duration</th>
<th>Responsibility</th>
</tr>
</thead>
</table>
| Appoint technically qualified staff for Operation & Maintenance of ETP plant   | • Appoint technically qualified staff for Operation & Maintenance of ETP plant  
• Check the treated effluent quality on regular basis  
• Regularly check manholes and clean surface drains periodically  
• Ensure not to obstruct natural drainage system  
• Adhere with national planning rules & regulations and approved plans                                                                                                                                                                                                                                                                                                                                 | Observation Phase | Observation, records | DIZ, IIZ | Long Term | Proponent      |
| Hospital Waste only to be autoclaved before its disposal                      | • Hospital Waste only to be autoclaved before its disposal  
• Reduce the use of plastics and recycle as possible                                                                                                                                                                                                                                                                                                                                                                           | Observation Phase | Observation, records | DIZ, IIZ | Long Term | Proponent      |
| Effective use of electricity                                                  | • Effective use of electricity  
• Renewable Energy source such as Solar Energy                                                                                                                                                                                                                                                                                                                                                                               | Observation Phase | Observation, measurement, discussion | DIZ, IIZ | Long Term | Proponent      |
| Construction of Recharging pits through Rain water Harvesting                | • Construction of Recharging pits through Rain water Harvesting                                                                                                                                                                                                                                                                                                                                                              | Observation Phase | Observation, measurement, records, discussion | IIZ | Long Term | Proponent      |
| Chemical Environmen                                                           | Radiation hazard from radiological equipments  
• Authorization for the use of such equipments.  
• Separate outfits for indirect radiation exposing staffs                                                                                                                                                                                                                                                                                                              | Observation Phase | Observation, records, discussion | DIZ | Long Term | Proponent      |
| Chemical and heavy metal wastes and                                           | • Careful handling and storage of hazardous chemicals in designated locations.  
• Authorization for the use of such chemicals.                                                                                                                                                                                                                                                                                                                     | Observation Phase | Observation, records, discussion | DIZ, IIZ | Long Term | Proponent      |
<table>
<thead>
<tr>
<th>Likely impacts</th>
<th>Adverse impact mitigation measures</th>
<th>Schedule</th>
<th>Method</th>
<th>Location</th>
<th>Duration</th>
<th>Responsibility</th>
</tr>
</thead>
</table>
| effluent                                                                      | • Separate outfits for the lab workers, and other staffs dealing with chemicals.  
• Proper Disposal of faeces and other waste                                                                                                                                         |          |                             |          |           | Proponent       |
| Contamination of ground water                                                | • Use of native plants in landscape which don't need much water or fertilizer  
• Well maintained Septic System  
• Proper disposal of Garbages and hazardous chemicals  
• Proper disposal of medicines                                                                                                                                                    | Observation Phase | Observation, records, discussion | IIZ       | Long Term  | Proponent       |
| Air pollution due to handling of chemicals and burning of waste              | • Greenbelt development which can filter the toxic air pollutants  
• Maintainence of Generators                                                                                                                                                    | Observation Phase | Observation, records, discussion | DIZ, IIZ | Long Term  | Proponent       |

**Biological Environment**

| Greenery maintenance and protection                                          | • Use of Native plants for greenery maintenance  
• Maintenance of green area                                                                                                                                                    | Observation Phase | Observation, records          | DIZ, IIZ | Long Term  | Proponent       |
| Impact on aquatic environment due to sewerage                                | • Proper treatment of the sewage before disposing into the river                                                                                                           | Observation Phase | Observation, records          | IIZ       | Long Term  | Proponent       |

**Socio-economic and cultural Environment**

| Issue of Occupational health and safety of the workers                        | • MCOMS will instruct the contractors not to employ child labor and follow the labor laws.  
• The management of the medical college is very much committed to health and safety issues. Safety first will be the slogan of the project. All workers associated with the construction work | Observation Phase | Records, discussion            | DIZ       | Long Term  | Proponent       |
<table>
<thead>
<tr>
<th>Likely impacts</th>
<th>Adverse impact mitigation measures</th>
<th>Schedule</th>
<th>Method</th>
<th>Location</th>
<th>Duration</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>will be instructed and trained on health and safety related activities and issues including Emergency Preparedness Plan. • Provide helmet and masks for each worker. • Keep First-Aid-Kits at appropriate places. • Organize health &amp; safety awareness programs for workers. • Adhere with labor act and regulations. • Do not allow alcohol consumption at project site and coordinate with local police. • Organize interaction between local people and employees to maintain good relationship so that no obstruction occurs in future days.</td>
<td>Obsevation Phase</td>
<td>Records, discussion</td>
<td>DIZ</td>
<td>Long Term</td>
<td>Proponent</td>
</tr>
<tr>
<td>Food safety issues for patient, visitors and staffs</td>
<td>• Maintain hygiene in the kitchen area (Daily cleaning, storage of food in designated locations). • Food hygiene and sanitation awareness banners to be displayed at visible places • Space for the canteen is allocated far from radiation, laboratory, morgue room &amp; waste management units. • Provision of necessary sanitation facilities like tissue rolls, soaps, water etc. • Timely hygiene monitoring check will be done from hospital authority Health insurance and compensation for major accidents • Organize interaction between local people and employees as required.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likely impacts</td>
<td>Adverse impact mitigation measures</td>
<td>Schedule</td>
<td>Method</td>
<td>Location</td>
<td>Duration</td>
<td>Responsibility</td>
</tr>
<tr>
<td>----------------</td>
<td>-----------------------------------</td>
<td>----------</td>
<td>--------</td>
<td>----------</td>
<td>----------</td>
<td>----------------</td>
</tr>
</tbody>
</table>
| Issue of health and sanitation in and around the vicinity | • Provision of Morgue rooms and Refrigerating corpses to avoid foul smell and delay decomposition for dead bodies.  
• Separate outfits for indirect radiation exposing staffs  
• Cleaning and Disinfecting of the hospital area  
• Routine maintenance of sterilizing equipments. | Observation Phase | Records, discussion | DIZ, IIZ | Long Term | Proponent |
| Issues of Grievances | • Installation of Suggestion box in the various places  
• Regular Interaction program with the patients, visitors, staffs and students by the hospital committee themselves | Observation Phase | Records, discussion, observation | DIZ, IIZ | Long Term | Proponent |
| Pressure on community resources and infrastructure | • Coordinate with local bus service providers for local transportation system to the hospital.  
• A separate electricity connection has already issued by th hospital which will not create extra pressure of electricity demand.  
• Three boles within the hospital is fulfilling water demand  
• Allocation of enough parking area | Observation Phase | Records, discussion, observation | IIZ | Long Term | Proponent |
| Law and order situation | • MCOMS will all the time try to have harmonious relation and amicable settlement of any conflict whenever they arise.  
• MCOMS will coordinate with local authorities for settlement of such problems. | Observation Phase | Records, discussion, observation | IIZ | Long Term | Proponent |
9.2 MONITORING PLAN AND SCHEDULE

Though the adverse impacts of the proposed project on physical, biological, and socio-economic and cultural environment except the impact of the generated health care waste will be minimal, MCOMS commits itself to conduct the proposed monitoring programs as the prime responsibility. Provisions for the third-party monitoring will also be made in order to make the unbiased judgment. To promote monitoring activities as an integral part of the proposed project, the types of monitoring, its indicators, schedules and responsible agencies are presented in following sub-sections.

There are three types of monitoring requirements in EIA. According to the EIA guidelines, the environmental monitoring encompasses the environmental assessment at different stages of the project implementation. Baseline monitoring aims to identify, collect, and verify the additional environmental baseline data related to physical as well as socio-economic aspects, needed to augment information on baseline conditions initially generated. Compliance monitoring is necessary to encourage and promote the proponent to comply with the requirements as listed in the mitigation measures and any condition set-forth during the project approval. Impact monitoring is included to determine the actual level of impact in the field during the construction and operation of the proposed project.

The nature and purpose of environmental monitoring is different in various stages of project processes. Pre-condition stage (Design and investigation), Construction stage and operation stage.

The following sections identify the types of monitoring required, monitoring schedule and the parameters to be monitored. The monitoring plan is summarized in Table 27 and Table 28.

**Baseline Monitoring**
Baseline monitoring is required to document the changes in the baseline environmental conditions prior to implementing the project. In relation to this project, there is very less probability of any remarkable change in the collected baseline data. So, no baseline data collection would be performed unless there are major changes during implementation phase.

**Compliance Monitoring**
The following activities would be conducted to ensure compliance with the recommendation of the EIA study:
1. Following the completion of the detailed designs and the tender document, it would be confirmed that whether the documents have incorporated the measures recommended by the EIA study
2. During contract, it shall be confirmed that the documents and working methods proposed by the contractors have taken into account the health, safety and environmental considerations mentioned in the tender document.

3. At the beginning of the construction period, it shall be confirmed that the arrangements regarding temporary use of lands for labor camps, material storage and construction activities are satisfactory.

4. During construction, it shall be confirmed on a regular basis that all the agreed working conditions and procedures, regarding various environmental factors are followed satisfactorily.

5. During construction and after the completion of construction, it shall be ensuring that all requirements regarding clean up and reinstatement have been met satisfactorily.

### Table 27 Compliance Monitoring Plan

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Indicators</th>
<th>Methods</th>
<th>Schedule/period</th>
<th>Responsible Implementing Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operation Phase</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical and Biological Environment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance of greenery and open space</td>
<td>Green area</td>
<td>Inspection</td>
<td>Once a year in operation period</td>
<td>Proponent</td>
</tr>
<tr>
<td>Drainage and sewerage systems</td>
<td>Construction of drainage system</td>
<td>Inspection</td>
<td>Operation period</td>
<td>Proponent</td>
</tr>
<tr>
<td>Management of waste water</td>
<td>Water quality parameter of waste water treatment plant</td>
<td>Sampling, lab testing and comparison with generic standard</td>
<td>Quartely (Pre-monsoon, Monsoon and Post Monsoon)</td>
<td>Proponent</td>
</tr>
<tr>
<td>Management of HC waste</td>
<td>Active involvement of health care waste management unit</td>
<td>Inspection and review of documents including minutes</td>
<td>Once a year</td>
<td>Proponent</td>
</tr>
<tr>
<td></td>
<td>Solid waste segregation</td>
<td>Inspection</td>
<td>Everyday</td>
<td>Proponent</td>
</tr>
<tr>
<td></td>
<td>Installation of treatment facility of risk waste along with pathological waste</td>
<td>Inspection</td>
<td>once a time</td>
<td>proponent</td>
</tr>
<tr>
<td>Management</td>
<td>Ambient air</td>
<td>Inspection and review of</td>
<td>Once a year</td>
<td>Proponent</td>
</tr>
</tbody>
</table>
## Environmental Impact Assessment of Manipal College of Medical Sciences

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Indicators</th>
<th>Methods</th>
<th>Schedule/period</th>
<th>Responsible Implementing Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>of air pollution</td>
<td>quality</td>
<td>documents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management of Noise Pollution</td>
<td>Noise level</td>
<td>Measurement using noise meter</td>
<td>Once a year</td>
<td>Proponent</td>
</tr>
</tbody>
</table>

### Socio-economic and Cultural Environment

| Priority for local employment                  | Employment records            | Appointment/employment records        | Once after every vacancy announcement | Proponent                      |
| Local students                                 | Number of local students enrolled | Review of enrollment list            | Once a year                      | Proponent                       |
| Facilitating local business and suppliers      | Number of local suppliers     | Review the list of suppliers          | Quarterly                        | Proponent                       |
| On the-Job Trainings                           | List of attachment            | Review of OJT list                   | Once in a year                   | Proponent                       |
| Lobbying For social services                   | Documented evidences of the efforts of the efforts made | Review of documents | Once in a year | Proponent |
| Formation and operation of Health & Safety committee | Organization structure/documen  | Review of documents including minutes | Once a year | Proponent |
| Awareness training emergency preparedness      | Number of trainings and list of participants | Review of training programs | Once in a year | Proponent |

### Impact Monitoring

The actual impacts due to project implementation will be closely monitored during construction and operation of the projects to make the mitigation measures more effective and to dispense with redundant measures.

The following activities have been listed to conduct the Impact Monitoring:

1. Have regular meeting of the coordination committee, which has also the representation of the local people.
2. Inspection of the levels of air, noise, water and land pollution at regular intervals during construction.

3. Regular inspection of the water supply and sanitation situation in the temporary labor quarters and the construction areas would be carried out. The quality of water being supplied in the college, hostel and hospital would be tested regularly.

4. Regular check up of the health of the local inhabitants by setting up health camps would be done to ensure that there is no spread of communicable diseases.

### Table 28 Impact Monitoring Plan

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Indicators</th>
<th>Methods</th>
<th>Schedule</th>
<th>Responsible Implementing Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical and Biological Environment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health services</td>
<td>Patients served and types of services</td>
<td>Review of records</td>
<td>Every year</td>
<td>Proponent</td>
</tr>
<tr>
<td>HR development</td>
<td>Number and types of qualified health professionals</td>
<td>Review of records</td>
<td>Every year</td>
<td>Proponent</td>
</tr>
<tr>
<td>Pressure on utilities</td>
<td>Complaints</td>
<td>Interviews</td>
<td>Every year</td>
<td>Proponent</td>
</tr>
<tr>
<td>Air quality</td>
<td>PM₁₀, TSP</td>
<td>Measurement</td>
<td>Every year</td>
<td>Proponent</td>
</tr>
<tr>
<td>Waste water</td>
<td>Compliance to generic standard</td>
<td>Sampling and testing</td>
<td>Quarterly</td>
<td>Proponent</td>
</tr>
<tr>
<td>Management of healthcare waste</td>
<td>Compliances to guidelines</td>
<td>Inspection</td>
<td>Every year</td>
<td>Proponent</td>
</tr>
<tr>
<td>Noise Pollution</td>
<td>Noise level</td>
<td>Measurement</td>
<td>Every year</td>
<td>Proponent</td>
</tr>
<tr>
<td>Traffic</td>
<td>Traffic congestion</td>
<td>Observation, records</td>
<td>Every year</td>
<td>Proponent</td>
</tr>
</tbody>
</table>

**Socio-Economic and Cultural Environment**

| Employment of local people        | Number and types of employees                  | Review of records        | Every year| Proponent                       |
| Facilitation to local business    | Number of local suppliers                      | Review of procurements   | Every year| Proponent                       |
| Health and safety                 | Accidents and complaints records               | Review of records        | Twice a year| Proponent                       |

### Table 29 Compliance of hospital with Nepal Government Health Standards

<table>
<thead>
<tr>
<th>S.N</th>
<th>Health related Standards</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.N</td>
<td>Health related Standards</td>
<td>Remarks</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------------------------------------------------------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>1.a</td>
<td>WHO standard infection prevention</td>
<td>Yes</td>
</tr>
<tr>
<td>1.b</td>
<td>Standard operation manual</td>
<td>Yes</td>
</tr>
<tr>
<td>1.c</td>
<td>Availability of information desk/ separate room</td>
<td>Yes</td>
</tr>
<tr>
<td>1.d</td>
<td>Availability of Patient Charter in visible location</td>
<td>Yes</td>
</tr>
<tr>
<td>1.e</td>
<td>Provision of 24-hour emergency service</td>
<td>Yes</td>
</tr>
<tr>
<td>1.f</td>
<td>Availability of 10% bed free for poor patients</td>
<td>Yes</td>
</tr>
<tr>
<td>1.g</td>
<td>Availability of needed bed to elderly people</td>
<td>Yes</td>
</tr>
<tr>
<td>1.h</td>
<td>Availability of Grievance box in visible location</td>
<td>Yes</td>
</tr>
<tr>
<td>1.i</td>
<td>Implementation of building code and standards</td>
<td>Yes</td>
</tr>
<tr>
<td>1.j</td>
<td>Hospital Disaster Management plan and appointment of contact person</td>
<td>Yes</td>
</tr>
<tr>
<td>1.k</td>
<td>Appointment of information officer</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>Hospital operation following Nepal Medical Council Standards</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>Preparation and submission of Annual self-evaluation report district health office</td>
<td>Yes</td>
</tr>
<tr>
<td>4.a</td>
<td>Road access to hospital</td>
<td>Yes</td>
</tr>
<tr>
<td>4.b</td>
<td>Enough Availability of water, electricity and telecommunication</td>
<td>Yes</td>
</tr>
<tr>
<td>4.c</td>
<td>Enough parking space</td>
<td>Yes</td>
</tr>
<tr>
<td>4.d</td>
<td>Enough open space for plantation</td>
<td>Yes</td>
</tr>
<tr>
<td>5.a</td>
<td>Availability of drinking water in WHO standards</td>
<td>Yes</td>
</tr>
<tr>
<td>5.b</td>
<td>Water quality monitoring of In-patient and Out-patient wards, Nursing unit, Operation theatre and Emergency departments</td>
<td>Yes</td>
</tr>
<tr>
<td>5.c</td>
<td>24 hr electricity service and availability of backup system in load shedding</td>
<td>Yes</td>
</tr>
<tr>
<td>S.N</td>
<td>Health related Standards</td>
<td>Remarks</td>
</tr>
<tr>
<td>-----</td>
<td>------------------------------------------------------------------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>5.d</td>
<td>Availability of enough latrine in different departments to patients, doctors and visitors</td>
<td>Yes</td>
</tr>
<tr>
<td>5.e</td>
<td>Availability of operation and maintenance</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>There is separate maintenance section</td>
</tr>
<tr>
<td>5.f</td>
<td>Availability of waiting rooms</td>
<td>Yes</td>
</tr>
<tr>
<td>5.g</td>
<td>Availability of canteen services</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total 5 canteen</td>
</tr>
<tr>
<td>5.h</td>
<td>Availability of laundry services inside the hospital premises</td>
<td>Yes</td>
</tr>
<tr>
<td>5.i</td>
<td>Good storage facility for emergency as well as needed supply for up to 1 month</td>
<td>Yes</td>
</tr>
<tr>
<td>5.j</td>
<td>Good security service</td>
<td>Yes</td>
</tr>
<tr>
<td>5.k</td>
<td>Operation of at least 1 ambulance and emergency medicine training for medical attendant</td>
<td>Yes</td>
</tr>
<tr>
<td>5.l</td>
<td>Provision of vehicle service to at least night duty staffs</td>
<td>Yes</td>
</tr>
<tr>
<td>6</td>
<td><strong>Hospital waste</strong></td>
<td></td>
</tr>
<tr>
<td>6.a</td>
<td>Follow of hospital waste management, solid waste management act 2068 and waste management regulation 2070.</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hospital has appointed the institution to manage the HCWM waste as per guideline</td>
</tr>
<tr>
<td>6.b</td>
<td>Segregation of waste at source</td>
<td>Yes</td>
</tr>
<tr>
<td>6.c</td>
<td>Disinfecting infectious waste at source</td>
<td>Yes</td>
</tr>
<tr>
<td>7</td>
<td><strong>Other hospital related standards</strong></td>
<td></td>
</tr>
<tr>
<td>7.a</td>
<td>Different wards for Male and Female</td>
<td>Yes</td>
</tr>
<tr>
<td>7.b</td>
<td>General ward less than 25 beds</td>
<td>Yes</td>
</tr>
<tr>
<td>7.c</td>
<td>One common room with less than 6 beds</td>
<td>Yes</td>
</tr>
<tr>
<td>7.d</td>
<td>Each ward with separate nursing station</td>
<td>Yes</td>
</tr>
<tr>
<td>7.e</td>
<td>Availability of single, double and cabin rooms in every ward</td>
<td>Yes</td>
</tr>
<tr>
<td>7.f</td>
<td>In major surgery service hospital availability of cardiac monitor, ventilator, post-operative recovery equipment.</td>
<td>Yes</td>
</tr>
<tr>
<td>7.g</td>
<td>Provision of blood service in hospital</td>
<td>Yes</td>
</tr>
<tr>
<td>7.h</td>
<td><strong>Mortuary</strong></td>
<td></td>
</tr>
</tbody>
</table>
### Table 1: Environmental Implications

<table>
<thead>
<tr>
<th>S.N</th>
<th>Health related Standards</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.h.i</td>
<td>Availability of mortuary in separate location inside hospital</td>
<td>Yes</td>
</tr>
<tr>
<td>7.h.ii</td>
<td>Dead bodies in mortuary kept in anti-decay</td>
<td>Yes</td>
</tr>
<tr>
<td>7.h.iii</td>
<td>Availability of sanitation unit/environmentalist/staff for hospital waste management</td>
<td>Yes</td>
</tr>
<tr>
<td>7.j</td>
<td>Safety</td>
<td></td>
</tr>
<tr>
<td>7.j.i</td>
<td>Anti-lightening technology, availability of alternative ladder, Fire extinguishers, Fire alarm, smoke detection</td>
<td>Yes</td>
</tr>
<tr>
<td>7.j.ii</td>
<td>Induction training to staffs related to fire, earthquake) and Drill practice.</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*Note: Compliance with additional health standards are mentioned in the Self-appraisal report of MCOMS 2018*

### 9.3 INSTITUTIONAL ARRANGEMENT FOR IMPLEMENTATION OF EMP

MCOMS is committed in implementing EMPs through its management, the contractors and the supervising consultant to ensure its implementation. MCOMS commits to establish an Environmental Management Cell (EMC) as an integral part of the project to ensure the implementation of EMPs and monitoring as an in-built mechanism within MCOMS. The EMC will focus on compliance monitoring, record keeping and providing inputs to the contractors. This EMC will be headed by a director level personnel and report to the Executive Director and also to the Waste and Safety Management Committee (WSMC).

The responsibility of the EMC will include the following:
- Preparation of environmental reports
- Ensuring the implementation of EPMs
- Compliance monitoring and taking corrective actions on any defaults
- Getting impact monitoring done
- Conducting regular meeting of coordination committee and representing MCOMS in the meeting relating to environmental, health and safety
- Record keeping on environment, health and safety

### 9.4 BUDGETS FOR EMP IMPLEMENTATION

**Benefit Augmentation, Mitigation and Compensation**
The benefit augmentation, mitigation and compensatory measures are the parts of the project development. Hence, most of their cost will be included in the project cost. Most
of the benefit augmentation and mitigation measures are included in the engineering design and under the study report of mitigation measures. Necessity for contract provision and the specifications will be included in the tender document and their cost is included in the engineering estimates.

9.5 MONITORING COST

The monitoring cost for operation phase of the project are estimated and given in the Table 30 below:

<table>
<thead>
<tr>
<th>Operation phase</th>
<th>Amount (NRS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compliance monitoring</td>
<td>150,000</td>
</tr>
<tr>
<td>Impact monitoring</td>
<td>300,000</td>
</tr>
<tr>
<td>Laboratory Analysis</td>
<td>100,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>550,000</strong></td>
</tr>
</tbody>
</table>
9.6 ENVIRONMENTAL AUDITING

Environmental auditing is conducted to know the pre and post project state of environmental resource by assessing actual impacts (Uprety, 2003). As per the provisions of the EPR, 1997, Ministry of Forests and Environment (MoFE) has to conduct environmental audit after two years from the commencement of the operations of MCOMS. MCOMS will help and cooperate in the environmental auditing.

Auditing refers to a general class of environmental investigation that is used to verify past and current environmental performances. Environmental Auditing will be performed only once for the project. Environmental impact auditing assesses the actual environmental impact, accuracy of prediction, effectiveness of environmental impact mitigation, and enhancement measures and functioning of monitoring mechanisms.

Types of Auditing

National EIA Guidelines provides for the following different types of environmental impact audits in the EIA process:

- Decision point auditing- examines the effectiveness of EIA as a decision-making tool
- Implementation auditing- ensures that the conditions of construction have been met
- Performance auditing- studies the work of agencies associated with project management
- Project impact auditing- examines environmental changes arising from project implementation
- Predictive technique auditing- examines the accuracy and utility of predictive techniques by comparing actual against predicted environmental impact
- EIA Procedure Auditing- examines critically the methods and approaches adopted during the EIA study

The project impact auditing and performance auditing will be mainly used for the MCOMS. Environmental Auditing plan proposed for MCOMS is given in the Table 31 below:

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Location</th>
<th>Methods</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Environment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid waste including healthcare waste</td>
<td>MCOMS premises</td>
<td>Inspection</td>
<td>Type and quantity of wastes and disposal</td>
</tr>
<tr>
<td>Waste water</td>
<td>Drains</td>
<td>Analysis of wastewater samples</td>
<td>COD, BOD, PH, hazardous chemicals</td>
</tr>
<tr>
<td>Air quality</td>
<td>In and around project area</td>
<td>Interview, inspection and measurement</td>
<td>TSP, PM&lt;sub&gt;10&lt;/sub&gt; (micrograms)</td>
</tr>
<tr>
<td>Noise</td>
<td>In and around project area</td>
<td>Interview, inspection and measurement</td>
<td>dB</td>
</tr>
<tr>
<td>Biological Environment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Covered area and greenery</td>
<td>Project areas</td>
<td>observation</td>
<td>Percentage of covered area</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------</td>
<td>-------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td><strong>Socio-economic and Cultural Environment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health service</td>
<td>Hospital</td>
<td>Review of records and interviews</td>
<td>Number of patients and type of health services</td>
</tr>
<tr>
<td>HR Development</td>
<td>Medical college</td>
<td>Review of records and interviews</td>
<td>Number and type of qualified graduates</td>
</tr>
<tr>
<td>Economic status of the local people</td>
<td>Around the project areas</td>
<td>Survey, interview</td>
<td>Change in patterns</td>
</tr>
</tbody>
</table>

**Environmental Auditing Cost**

MCOMS will facilitate the environmental auditing. The expenditure incurred by the proponent for facilitating such auditing is estimated to be around Rs. 650,000.00.
CHAPTER 10: PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

The Government of Nepal had provided opportunities to the local communities to involve in development project through the legal frame work. The Environment Protection Act, 1997 rule 4(1), 7(2) and 11 (2) facilitates the local community to take part in different stages of EIA process. The proponent of this EIA study has strongly followed these legal provisions during the study.

Public Notice

As per the EPR, 1997 rule 4(1) a scoping notice was published in Himalaya Times Nepali National daily on 2072/03/19 to get comments, suggestions and feedback from the community in the scoping document and incorporate them in ToR. Similarly, 30 days public notice will also be published two times in national daily newspaper after submission of the report to MoFE.

Public Hearing

Invitation letters were sent to local people and local organizations inviting them to participate in the public hearing that was held on 2075/07/30B.S. Local people, government officials, local government representatives and the experts were also invited. The copy of invitation letters is attached in the ANNEX F. There were 24 participants present from the local community along with other government bodies and they all have taken active participation in the Public Hearing held at project site of MCOMS. The Nepali executive summary of draft report of EIA study was distributed to representatives of local government bodies and local people present at the public hearing and findings of the draft EIA report was also presented before them.

Figure 20 Public hearing conducted at MCoMS

The copies of the lists of participants, to whom invitation letters were handed over and who were present in the public hearing program are also attached in the ANNEX F. Major issues raised by the local people, representatives of government/non-government organizations and other concerned stakeholders are summarized below.
### Table 32 Collection of suggestion/opinion of Public hearing

<table>
<thead>
<tr>
<th>S.N</th>
<th>Suggestions/Optinions</th>
<th>Recommendation made in EIA report</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wastewater treatment facility available in Dip college premises (academic wings section)</td>
<td>Since there are very few residential buildings and most of the buildings are for office purpose, provision of septic tank will be sufficient enough.</td>
</tr>
<tr>
<td>2</td>
<td>Seismic vulnerability assessment of the building should be done</td>
<td>It's done</td>
</tr>
<tr>
<td>3</td>
<td>College should support the construction of road from Shivamandir to Hospital</td>
<td>mitigation cost is allocated in table 24 (S.N.10)</td>
</tr>
<tr>
<td>4</td>
<td>There should be regular cleanliness and sanitation within the college area including area covered by shrubs in the greenery space of the college</td>
<td>mitigation cost is allocated in table 24 (S.N.10)</td>
</tr>
<tr>
<td>5</td>
<td>Schoralship should be provided to the students from local community</td>
<td>College is providing scholarships to students as per government provision.</td>
</tr>
<tr>
<td>6</td>
<td>There should be provision of air filtering in dead body management and waste management section</td>
<td>included in mitigation measures</td>
</tr>
<tr>
<td>7</td>
<td>There should be safe 3-phase electricity system</td>
<td>included in mitigation measures</td>
</tr>
<tr>
<td>8</td>
<td>Hospital should be in regular operation without any strikes</td>
<td>included in mitigation measures</td>
</tr>
<tr>
<td>9</td>
<td>ETP of the college should be in smooth operation and effluent discharge from the ETP should be as per GoN standard</td>
<td>included in mitigation measures</td>
</tr>
<tr>
<td>10</td>
<td>College should local Kanhudanda community forest users group in forest management</td>
<td>mitigation cost is allocated in table 24 (S.N.10)</td>
</tr>
<tr>
<td>11</td>
<td>College should support in roadside plantation of the access road</td>
<td>mitigation cost is allocated in table 24</td>
</tr>
</tbody>
</table>
CHAPTER 11: CONCLUSION AND RECOMMENDATION

The operation of the Manipal College of Medical Sciences has brought a number of beneficial impacts such as the production of skilled human resources in the field of medical science, addition and improvement in the health care services and promotion of economic activities. There are also some potential adverse impacts to human health and environment from the operation of the college and the hospital.

EIA study has identified, predicted and evaluated the beneficial as well as adverse impacts and it has also suggested mitigation, elimination or minimization measures of adverse impacts and augmentation of beneficial. The beneficial impacts out-weigh the adverse impacts and it is possible to eliminate or minimize the adverse impacts by carrying out the environmental management plan as a part of project development suggested in the report.

Therefore, this EIA report has recommended for the implementation of the proposal with due consideration and implementation of all the recommended mitigation measures. Environmental Management System, Environmental Management Plan, Environmental Auditing Plan have been also provided and they are recommended for the implementation so that the proposal will bring more benefits to the human and environment while reducing the risk to the environment.
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- MOFE, 1997, Environmental Protection Act 1996, Environmental Protection Regulation 1997 (amended in 1999), Ministry of Forest and Environment
- Pokhara Sub-Metropolitan, 2070/071. Annual Report, Kaski
- Safe Guarding the resources, Environmental Impact Assessment, Process and Practice, Batu Krishna, Upreti, Mrs. Uttara Upreti, Kathmandu, Koteshwore, 2003
- Self Appraisal Report, 2017, Manipal Teaching Hospital, Kathmandu, Nepal