KENYA NATIONAL HIGHWAYS AUTHORITY

CONSULTANCY SERVICES FOR THE FEASIBILITY, PRELIMINARY AND DETAILED ENGINEERING DESIGN

OF

BARAGOI-NORTH HORR (A4) ROAD

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

REPORT

JANUARY 2020

KIRI CONSULT LTD **Civil, Structural, project management Survey & Environmental Consultants** **P.O Box 4125-00506** **Nairobi, Kenya**	**DIRECTOR HIGHWAY PLANNING & DESIGN(D&C), KENYA NATIONAL HIGHWAYS AUTHORITY (KeNHA)** **P.O Box 49712-00100,** **NAIROBI.**	**DIRECTOR GENERAL, KENYA NATIONAL HIGHWAYS AUTHORITY (KeNHA)** **P.O Box 49712-00100,** **NAIROBI.**

DECLARATIONS

I, Julius M. Musili on behalf of KIRI Consult Limited, submit this **ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY Report** of the ***Proposed Feasibility study, Environmental and social Impact, Preliminary and detailed engineering design of Constructions of Baragoi – North Horr (A4) Road,*** in Samburu and Marsabit Counties. The ESIA Study has been carried out in accordance with the Environmental Management and Coordination Act, Cap 387, and the Environmental (Impact Assessment and Audit) Regulations, 2003 (and the amendment Regulations of 2016).

*Signed at NAIROBI on this*_____*day of*_____*2020*

Signature: _____

Designation: EIA/AUDIT LEAD EXPERT REG. NO.3074

CONTACT: +254 710495542, PO Box 1784 - 00606 Sarit Centre Nairobi

I, _____on behalf of **Kenya National Highways Authority (KeNHA)**, submit this ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY of the ***Proposed Feasibility study, Environmental and social Impact, Preliminary and detailed engineering design of Constructions of Baragoi – North Horr (A4) Road*** in Samburu and Marsabit Counties.

Signed at _____*on this* _____*Day of* _____*2020*

Signature _____

Designation: _____

CONTACT DETAILS: _____

Table of Contents

DECLARATIONS ..... **i**

Table of Contents ..... **ii**

EXECUTIVE SUMMARY ..... **i**

1. INTRODUCTION **1**

1.1 Project Background *1*

1.2 Project Location *1*

1.3 Project Scope *2*

1.4 Justification of the Project *2*

1.5 ESIA objectives *2*

1.5.1 Broad Objective 2

1.5.2 Specific Objectives 3

1.6 Justification of the ESIA *3*

1.7 Terms of Reference *3*

1.8 The Environmental Impact Assessment Team *4*

2. METHODOLOGY **5**

2.1 Environmental screening *5*

2.2 Environmental scoping *5*

2.3 Desktop study *5*

2.4 Site assessment *6*

2.5 Public participation *6*

2.5.1 Key Stakeholder Meeting *7*

2.5.2 Public Meetings *7*

2.5.3 Socio-economic/Household survey *7*

2.6 Data analysis, reporting and documentation *7*

2.7 ESIA organization and structure *7*

3. PROJECT DESCRIPTION **9**

3.1 Project Brief *9*

3.2 Project description *9*

3.2.1 Road categories in the project road alignment 10

3.3 Design Guidelines *10*

3.4 Bridges and Culverts *11*

3.5 Pavement design *11*

3.6 Main Junction and Interchanges *11*

3.7 Access Roads *11*

3.8 Alignment *12*

3.9 Baragoi – North Horr (A4) Alignment Detailed with Environmental and Social Concerns *13*

3.9.1 Baragoi 13
3.9.2 Loruko 14
3.9.3 Loruko Community settlement 14
3.9.4 Elmerim 15
3.9.5 South Horr 16
3.9.6 St. Joseph Catholic Church and Catholic Dispensary/ Maternity 17
3.9.7 ECD Center/Permanent Building 17
3.9.8 Manyatta Settlement (Sere Nyamruk) 18
3.9.9 Permanent & Manyatta Settlement 18
3.9.10 Kurungu 19
3.9.11 Manyatta Settlements 19
3.9.12 Anderi 20
3.9.13 Ntalatiani 20
3.9.14 Sarima 21
3.9.15 Lake Turkana Point A- Clearance A 21
3.9.16 Lake Turkana Point e- Clearance E 22
3.9.17 Lake Turkana Point B - Clearance B 22
3.9.18 Settlement Point 3 - (Manyatta) 23
3.9.19 Settlement Point 1 - (Manyatta) 23
3.9.20 Settlement Point 2- (Manyatta) 24
3.9.21 Lake Turkana Point C - El Molo - Clearance C 24
3.9.22 Lake Turkana Part F - Clearance F 25
3.9.23 North Horr region 25
3.9.24 North Horr - Tail Crossing Oasis (Major) 26
3.9.25 North Horr - Conserved Oasis and Livestock watering Point 26
3.9.26 Noth Horr - Suspected School (sensitive receptor) 27

3.10 Loops *27*
3.10.1 South Horr Loop 27
3.10.2 Kurungu Loop 29
3.10.3 Loiyangalani Loop 31
3.10.4 North Horr Town Loop 33

3.11 Quarries, borrow pits, stockpiles and spoil areas *35*
3.11.1 Provision of land 35

3.12 Safety and public health requirements *35*

3.13 Summary project activities *35*

3.14 Operation phase activities *36*

3.15 Decommissioning phase *36*

4. PROJECT ALTERNATIVES 40

4.1 "Without the project" scenario *40*

4.2 Analysis of alternative construction materials and technology *40*

4.3 Solid waste management alternatives *40*

4.4 Alternative mode of transportation *41*

5. BASELINE INFORMATION OF THE PROJECT AREA 42

5.1 Project location *42*
5.1.1 Project physical location 42

5.2 Administration *42*
5.2.1 Samburu County 42
5.2.2 Marsabit County 43

5.3 Socio-economic characteristics of the project area *43*
5.3.1 General characteristics of the Project Area 43

5.4 Ecological characteristics of the project area *55*
5.4.1 Ecological zones and climate 55

5.5 Climate *56*
5.5.1 Environment and Climate change 56
5.5.2 Topography 56
5.5.3 Soils and geology 57
5.5.4 Laggas 58
5.5.5 Habitats and vegetation 58
5.5.6 Aquatic Environment 59
5.5.7 Wildlife resources 60

5.6 Noise and Vibration *60*

6. POLICY LEGAL AND INSTITUTIONAL FRAMEWORK 61

6.1 Policy framework *61*
6.1.1 The Constitution of Kenya of 2010 61
6.1.2 National Environmental policy 61
6.1.3 Environmental Sustainability Guidelines 2017 64

6.2 National legal framework *65*
6.2.1 Environmental Management and Coordination Act (EMCA, Cap 387) 65
6.2.2 The Wildlife Management and Conservation Act 2013 66
6.2.3 Forest Conservation and Management Act, 2016 67
6.2.4 The Water Act 2016 67
6.2.5 The Agriculture, Fisheries and Food Authority Act of 2013 67
6.2.6 Energy Act, 2006 68
6.2.7 Land Act, 2012 68
6.2.8 The Land Registration Act, 2012 68
6.2.9 The National Land Commission Act, 2012 (No. 5 of 2012) 69
6.2.10 Community Land Act 2016 69
6.2.11 The Environment and Land Court Act, 2011 69
6.2.12 The County Governments Act 2012 70
6.2.13 Occupational Safety and Health Act 2007 70
6.2.14 The Public Health Act (Chapter 242) of Revised Edition 2012 70
6.2.15 The Valuers Act (Cap 532), 1985 70
6.2.16 Physical Planning Act (Cap. 286) 70
6.2.17 The Penal Code (Cap. 63 71
6.2.18 The Employment Act, 2007 71
6.2.19 Work Injury Compensation Benefit Act (WIBA) 2007 71
6.2.20 Public Roads and Roads of Access Act Cap 399 71
6.2.21 The Traffic Act Cap 403 72
6.2.22 Building Code 2009 72
6.2.23 The Kenya Roads Act, 2007 72
6.2.24 The Kenya Roads Board Act, 1999 73
6.2.25 HIV / AIDS Act, 2006 73
6.2.26 Urban Areas and Cities Act No 13 of 2011 73
6.2.27 The National Gender and Equality Act, 2011 73
6.2.28 The Sexual Offences Act, 2006 and its amendment 2012 73
6.2.29 Matrimonial Property Act (No. 48 of 2013) 73
6.2.30 Persons with Disability Act, Chapter 133 74
6.2.31 Security Laws (Amendment) Act, 2014 74

6.3 National institutional / Administrative framework for the proposed project *74*

6.4 International conventions and guidelines *77*

6.4.1 Vienna Convention on the Protection of the Ozone Layer 77
6.4.2 United Nations Convention on Biological Diversity (UNCBD) 77
6.4.3 African Convention on the Conservation of Nature and Natural Resources 77
6.4.4 Convention on International Trade in Endangered Species 77
6.4.5 The World Commission on Environment and Development (The Brundtland Commission of 1987) 77
6.4.6 The Ramsar Convention for the conservation and sustainable utilization of wetlands 78
6.4.7 United Nations Convention to Combat Desertification (UNCCD) 78
6.4.8 The 1992 United Nations Framework Convention on Climate Change (UNFCCC) 78
6.4.9 The Paris Agreement 78
6.4.10 Rio Declaration on Environment and Development 78
6.4.11 Earth Summit on Sustainable Development Agenda 21 79
6.4.12 Convention on the Rights of the Child 79
6.4.13 Convention on the Elimination of all forms of Discrimination against Women 79
6.4.14 International Labour Organization 79
6.4.15 Sustainable Development Goals (SDGs) 80

7. PUBLIC PARTICIPATION **82**

7.1 Objectives for consultation and public participation *82*

7.2 Methods used for consultation and public participation *82*
7.2.1 Household Socio-Economic Survey 82
7.2.2 Key stakeholder interviews 83
7.2.3 Focused group discussion (FGD) 83
7.2.4 Public meetings 84

7.3 Comments obtained during the public consultation meetings: *87*
7.3.1 Creation of employment opportunities 87
7.3.2 Increased business opportunities 87
7.3.3 Improved social infrastructure 87
7.3.4 Faster means of transport 87
7.3.5 Cheap / affordable fares 87
7.3.6 Easy and fast movement of people 87
7.3.7 Easy and fast movement of goods 87
7.3.8 Interaction of people from different communities 88
7.3.9 Growth of towns 88
7.3.10 Potential for increased economic activities 88
7.3.11 Transfer of skills 88
7.3.12 Improved security 88

7.4 Negative concerns of the stakeholders *88*
7.4.1 Increased Accidents 88
7.4.2 Impact on water resources 89
7.4.3 Noise pollution 89
7.4.4 Dust generation 89
7.4.5 Water pollution 89
7.4.6 Waste disposal and spoils 89
7.4.7 Loss of vegetation cover 90
7.4.8 Climate change and potential Impacts on road project 90
7.4.9 Loss of pasture for livestock and wildlife 90
7.4.10 Displacement of local communities and loss of property 90
7.4.11 Disruption and loss of businesses 90
7.4.12 Cultural erosion 90
7.4.13 Increase in the spread of STD, HIV and AIDS 91
7.4.14 Safety and Health 91
7.4.15 Vulnerable and Marginalized Groups (VMGs) 92
7.4.16 Human Right and Gender Inclusivity 92
7.4.17 Child Protection 92

7.5 Corporate social responsibility and social infrastructure 93

8. CLIMATE CHANGE 94

8.1 Climate Change Phenomenon 94
8.2 Project activities likely to contribute to climate Change 94
8.3 Proposed Climate Change intervention for the proposed project 94

9. POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS 95

9.1 Positive environmental and social impacts during construction phase 96
9.1.1 Creation of employment opportunities 96
9.1.2 Gains in the local and national economy 96
9.1.3 Transfer of skills 97
9.1.4 Provision of market and supply for building materials 97
9.1.5 Improvement of local and regional trade and business opportunities 97
9.1.6 Improved security 97
9.1.7 Improved social infrastructure 97
9.1.8 Interaction of people from different communities 97
9.1.9 Growth of towns 97
9.1.10 Corporate social responsibility (CSR) 97

9.2 Negative environmental and social impacts during construction phase 98
9.2.1 Noise pollution and excessive vibrations 98
9.2.2 Air pollution due to dust and exhaust emissions 98
9.2.3 Increased generation of solid waste 98
9.2.4 Increased energy consumption 99
9.2.5 Discharge of wastewater, sewage and degradation of water quality 99
9.2.6 Water abstraction and consumption 99
9.2.7 Modification of hydrology 99
9.2.8 Generation of storm water and impact on drainage 99
9.2.9 Increased soil erosion risk and soil quality degradation 99
9.2.10 Loss of vegetation cover and biodiversity 100
9.2.11 Disruption and loss of businesses 100
9.2.12 Spread of STD, HIV and AIDS 100
9.2.13 Gender Based Violence 100
9.2.14 Interference of existing development infrastructure 101
9.2.15 Insecurity 101
9.2.16 Cultural changes 101
9.2.17 Delays in transportation 101
9.2.18 Gender and equality biases 101
9.2.19 Occupational safety and health 101
9.2.20 Community health and safety 102
9.2.21 Disturbance to Wildlife 102
9.2.22 Increased loss of human and animal life due to road accidents 103
9.2.23 Reduced accessibility of neighbourhood areas 103
9.2.24 Community conflicts 103
9.2.25 Sexual Exploitation/Child Abuse 103
9.2.26 Cumulative Impacts 103

9.3 Positive environmental and social impacts during operation phase 103
9.3.1 Creation of employment opportunities 103
9.3.2 Improved local socio-economy 104
9.3.3 Increased security 104
9.3.4 Faster means of transport and Cheap / affordable fares 104
9.3.5 Gain to the county and national economy through transportation 104
9.3.6 Revitalization of large scale agriculture in the area 104
9.3.7 Reduction in particulate matter emissions (dust) 105
9.3.8 Improved road safety 105

9.4 Negative environmental and social impacts during operation phase 105
9.4.1 Noise pollution and excessive vibrations 105
9.4.2 Air pollution due to dust generation and air emissions 105
9.4.3 Impacts on livestock and wildlife breeding points 105
9.4.4 Increased consumption of fossil fuel 105
9.4.5 Storm water and impact on drainage 106
9.4.6 Loss of human life and livestock due to road accidents 106
9.4.7 Increased risk to community health and safety 106
9.4.8 Generation of solid waste 106
9.4.9 Soil quality degradation due to oil spills 107
9.4.10 Sexual Exploitation/Child Abuse 107
9.4.11 Cumulative Impacts 107

9.5 Positive impacts during decommissioning phase 107
9.5.1 Rehabilitation and restoration of the site to its original status 107
9.5.2 Employment opportunities 107
9.5.3 Reduced environmental pollution 107
9.5.4 Reduced negative environmental impacts of operation 108

9.6 Negative impacts during decommissioning phase 108
9.6.1 Solid waste generation 108
9.6.2 Noise and vibration 108
9.6.3 Dust emission 108
9.6.4 Reduced/ loss of positive impacts to the project 108

10. MITIGATION MEASURES AND MONITORING PROGRAMMES 109

10.1 Mitigation measures during the construction phase of the proposed Baragoi – North Horr road project 109
10.1.1 Mitigating noise pollution and excessive vibrations 109
10.1.2 Mitigating air pollution due to dust generation and air emissions 109
10.1.3 Minimizing generation of solid waste 110
10.1.4 Minimizing energy consumption 111
10.1.5 Mitigating discharge of wastewater, sewage and degradation of water quality 111
10.1.6 Minimizing water abstraction and consumption 112
10.1.7 Modification of hydrology of ASALs 112
10.1.8 Minimizing generation and movement of storm water and impact on drainage 113
10.1.9 Minimizing increased soil erosion risk and soil quality degradation 113
10.1.10 Minimizing loss of vegetation cover and biodiversity 114
10.1.11 Mitigating disruption and loss of businesses in the town centres traversed by the road 114
10.1.12 Minimizing the spread of STD, HIV and AIDS 115
10.1.13 Minimizing Gender Based Violence 115
10.1.14 Minimizing interference of existing development infrastructure 115
10.1.15 Minimizing security risk 115
10.1.16 Minimizing cultural changes 115
10.1.17 Minimizing delays in transportation 116
10.1.18 Gender equality 116
10.1.19 Minimizing occupational safety and health impacts 116
10.1.20 Minimizing negative community health and safety impacts 117
10.1.21 Minimizing disturbance to wildlife 118
10.1.22 Minimizing increased loss of human and animal life due to road accidents 118
10.1.23 Mitigating reduced accessibility of neighbourhood areas 119
10.1.24 Minimizing community conflicts 119
10.1.25 Mitigating sexual exploitation and child abuse 119
10.1.26 Mitigating Cumulative Impacts 119

10.2 Mitigation measures during the operation phase of the proposed Baragoi – Noth Horr road project 120
10.2.1 Mitigating noise pollution and excessive vibrations 120
10.2.2 Mitigation of impacts on livestock and wildlife 120
10.2.3 Minimizing fossil fuel consumption 120

10.2.4 Minimizing storm water run-off 121
10.2.5 Minimizing increased loss of human life and livestock due to road accidents 121
10.2.6 Minimizing negative community health and safety impacts 121
10.2.7 Minimizing generation of solid waste 121
10.2.8 Minimizing increased soil erosion risk and soil quality degradation 121
10.2.9 Minimizing sexual exploitation and child abuse 121

10.3 Mitigation measures during the decommissioning phase of the proposed Baragoi – North Horr road project *122*
10.3.1 Minimizing solid waste generation 122
10.3.2 Minimizing noise and vibration 122
10.3.3 Minimizing dust emission 122
10.3.4 Mitigating disruption and loss of businesses in the town centres traversed by the road 122

10.4 Environmental risks to the project *122*
10.4.1 Flush floods along the road corridor 122
10.4.2 Transport of dangerous goods 122
10.4.3 Fire 123
10.4.4 Wildlife attacks 123
10.4.5 Inter-ethnic Conflicts 123
10.4.6 Cattle rustling 124

10.5 Environmental risk management *124*

10.6 Environmental monitoring plan *124*

11. GRIEVANCES REDRESS MECHANISM 127

11.1 Process of Registering and Addressing Grievances *128*

11.2 Mechanism for Appeal *129*

11.3 Closure of grievance *129*

11.4 Grievance Log *129*

11.5 Monitoring Complaints *130*

12. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN 131

12.1 Introduction *131*

12.2 Cost of implementation the ESMPs *131*

12.3 Project ESMP Implementation *131*
12.3.1 Role of Environmental, Health and Safety and Social Experts 131
12.3.2 Project supervision 132

13. CONCLUSION AND RECOMMENDATIONS 150

REFERENCES 151

APPENDICES 152

LIST OF TABLES

Table 1-1: EIA Project Team
Table 3-1: Roads along the project alignment
Table 3-2: List of Access Roads
Table 3-3: The products, by products and waste generated during project cycle
Table 5-1: Coordinates of the town places along the proposed road
Table 5-2: Samburu County Administrative units
Table 5-3: Marsabit County Administrative units
Table 5-4: Projections by Age Cohort

Table 5-5: Population Projections by Age Cohort
Table 5-6: Sources of Water
Table 5-8: Sub-County areas prone to conflicts
Table 5-9: Main Wildlife Species and Their Status
Table 6-1: The relevant policies in the country
Table 6-2: Analysis of Key EMCA, 2015 Relevant Regulations
Table 6-3: National Institutions
Table 7-1: Key stakeholders' meetings at County Commissioner's Offices in Maralal and Marsabit
Table 7-2: The FGDs were held at the following areas
Table 7-3: Summary of the Attendance of Public Participation Meetings
Table 7-4: Public and Focused Group Discussions Meetings Photographs
Table 8-1: The broad linkages
Table 8-2: Levels of Scale used in the Analysis of Impacts
Table 9-1: Environmental monitoring plan for the proposed project
Table 10-1: Grievance Redress Mechanism Process
Table 11-1: Environmental and Social Management Plan – Design, Construction, Operation and Decommissioning Phases

List of Maps

Map 1: A4 (Formally C77) Alignment Map
Map 2: Map showing Project Alignment Profile
Map 3: Youth Camp - 1° 47' 37.86" N; 36° 47' 57.65" E, Ch. – Km 0+725
Map 4: ECD Center - 1° 58' 35.03" N; 36° 53' 24.26" E, Ch=Km 23+700
Map 5: Loruko Community settlement - 1° 58' 44.06" N; 36° 53' 30.74" E, Ch=Km 24+000
Map 6: Settlements (next to ECD Center) - 2° 1' 56.93" N; 36° 55' 27.00" E, CH= 31+400
Map 7: Permanent Building (Sere Nyamruk) - 2° 4' 25.10" N; 36° 55' 5.73" E, Ch=Km 36+200
Map 8: St. Joseph Catholic Church - 2° 5' 52.00" N; 36° 54' 55.92" E, Ch= Km 39+500 and Catholic Dispensary/Maternity - 2° 5' 52.31" N; 36° 54' 59.65" E, Ch=Km 39+650
Map 9: Manyatta Settlement (Sere Nyamruk) - 2° 5' 5.14" N; 36° 54' 50.49" E, CH=37+700
Map 10: Permanent & Manyatta settlement - between Km 39+900 & Km 41+300
Map 11: Shrine - 2° 1' 49.02" N; 36° 54' 22.72" E, Ch= Km 47+300
Map 12: Manyatta Settlements - Between Km 50+000 & Km 51+100
Map 13: Settlement - 2°13'12.45"N; 36°54'5.63"E, Ch= Km 53+700
Map 14: Shrine on the road side - 2°15'43.79"N; 36°53'15.84"E, Ch= Km 58+600
Map 15: Sarima Dispensary (Not properly equipped) - 2°30'53.12"N; 36°48'23.58"E, CH= 89+800
Map 16: Clearance A – (74m from the lake), 2°36'37.18"N; 36°41'58.68"E, Ch= Km 107+375
Map 17: Clearance E – (112m from the lake), 2°39'25.86"N; 36°41'27.35"E, Ch= Km 112+750
Map 18: Clearance B – (142m from the lake), 2°39'43.52"N; 36°41'32.58"E, Ch= Km 113+300
Map 19: Settlement (Manyatta) - 2°37'37.22"N; 36°42'1.88"E, Ch= Km 109+200
Map 20: Settlement (Manyatta) - 2°38'28.47"N; 36°41'56.10"E, Ch = Km 110+800
Map 21: Settlement (Manyatta) - 2°43'38.61"N; 36°42'42.32"E, Ch= Km 121+300
Map 22: Clearance C – (54.3m from the lake), 2°50'27.35"N; 36°42'16.60"E, Ch= Km 134+600
Map 23: *Clearance F – (94m from a water Point), 2°53'6.94"N; 36°43'10.39"E, Ch= Km 140+000*
Map 24: Settlement - 3°14'59.02"N; 36°59'46.82"E, Ch= Km 197+100
Map 25: Tail Crossing Oasis (Major) - 3°17'44.40"N; 37° 2'40.52"E, Ch= Km 205+000
Map 26: Conserved Oasis and Livestock watering Point - 3°18'49.92"N; 37° 3'49.54"E, Ch= Km 208+100. Proximity is 29m from the road
Map 27: Suspected School (sensitive receptor) - 3°18'56.67"N, 37° 4'31.90"E, CH= 209+550
Map 28: A view of the Loop in South Horr
Map 29: A view of affected businesses within South Horr loop
Map 30: Affected businesses from St. Josephs' Catholic – South Horr
Map 31: Affected Home in South Horr loop
Map 32: A view of the Kurungu loop
Map 33: An affected Business Kurungu Loop at Km 01+200
Map 34: A view of a shrine and Market within Kurungu Loop
Map 35: An expanded view of the Loiyangalani Loop
Map 36: A view of an affected business within Loiyangalani Loop at Km 01+300
Map 37: A view of affected businesses and homes wothin Loiyanaglani loop between Km 01+000 and Km 01+300
Map 38: A view of affected businesses and homes within Loiyanagalani Loop at Km 0+600 to Km 0+700km) and a public gathering space km 0+800

Map 39: A view of affected Manyattas (3) at Loiyangalani loop at Km 02+500 to Km 02+700
Map 40: An expanded View of North Horr Loop
Map 40: A view of an affected Homestead within North Horr loop at Km 02+000
Map 42: A view of affected Homes within North Horr loop at Km 02+500 to Km 02+800
Map 43: A view of affected homes and Business with A community gathering space within North Horr loop at Km 02+200

LIST OF APPENDICES

Appendix 1: Project Location and Layouts
Appendix 2: NEMA Certificate
Appendix 3: EIA and Social Field Tools
Appendix 4: Public meetings list of attendants and minutes
Appendix 5: General Photos of the Project Area

Acronyms

Asl:	Above Sea Level
A-RAP:	Abbreviated Resettlement Action Plan
ASALs:	Arid and Semi-Arid Lands
CBOs:	Community Based Organizations
CBD:	Convention on Biological Diversity
CCTVs:	Closed Circuit Televisions
CEDAW:	Convention on the Elimination of all forms of Discrimination against Women
CPP	Consultation and Public Participation
CRC	Convention on the Rights of the Child
CSOs	Civil Society Organizations
CSR	Corporate Social Responsibility
DHP	Designated Health Practitioner
EA	Environmental Audit
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Co-ordination Act
EMP	Environmental Management/Monitoring Plan
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
ESF	Environmental and Social Framework
ESS	Environmental and Social Standards
FGDs	Focused Group Discussions
FI	Financial Intermediaries
GDP	Gross Domestic Product
GHG	Greenhouse gases
GMM	Grievance Management Mechanisms
GOK	Government of Kenya
GRC	Grievance Redress Committee
IFC	International Finance Corporation
IPF	Investment Project Financing
ILO	International Labour Organization
KBS	Kenya Bureau of Standards
KeNHA	Kenya National Highways Authority
KeRRA	Kenya Rural Roads Authority
KFS	Kenya Forest Service
KWS	Kenya Wildlife Service
LHS	Left Hand Side
LDP	Local Development Plan
MEAs	Multi-Lateral Environmental Agreements
NBSAP	National Biodiversity Strategy and Action Plan
NCCRS	National Climate Change Response Strategy
NEAP	National Environment Action Plan
NET	National Environmental Tribunal
NEMA	National Environment Management Authority
NFD	Northern Frontier District
NGEC	National Gender Equality Commission

NGOs	Non-Governmental Organizations
NPEP	National Poverty Eradication Plan
NPGD	National Policy on Gender and Development
OSHA	Occupational Safety and Health Act
PAPs	Project Affected Persons
PCR	Physical Cultural Resources
PPC	Part of Project Cost
PPE	Personal Protective Equipment
PPPU	Public Private Partnership Unit
PVC	Polyvinylchloride
RAP	Resettlement Action Plan
RC	Reinforced Concrete
RDM	Road Design Manual
RHS	Right Hand Side
SDGs	Sustainable Development Goals
SHE	Safety Health and Environment
SWM	Solid Waste Management
ToR	Terms of Reference
TSS	Total Suspended Solids
TDS	Total Dissolved Solids
UNCBD	United Nations Convention on Biological Diversity
UNCCD	United Nations Convention to Combat Desertification
UNCED	United Nations Conference on the Environment and Development
UNEP	United Nations Environment Programme
UNFCC	United Nations Framework Convention on Climate Change
UNHCR	United Nations High Commission for the Refugees
VMGs	Vulnerable and Marginalized Groups
VOC	Volatile Organic Compounds
WB	World Bank
WHO	World Health Organization
WIBA	Work Injury Benefit Act
WRA	Water Resources Authority

Units

CO	Carbon Monoxide
dB(A)	Decibel Amperes
KES	Kenya Shillings
Km	Kilometres
km/h	Kilometre per hour
km^2	Square Kilometre
m^3	Cubic metre
mm	Millimetres
Ppm	Parts Per Million

EXECUTIVE SUMMARY

The Government of the Republic of Kenya (GoK) has earmarked funds through the Development Vote for use in engaging the services of a Consultancy Firm to undertake Feasibility study, Environmental and social Impact, Preliminary and detailed engineering design of Constructions of Baragoi – North Horr (A4) Road.

The Government of Kenya, through its implementing agency, the Kenya National Highways Authority (KeNHA) has contracted KIRI Consult Ltd to render all technical support services relevant to this exercise.

KIRI Consult shall perform all assignments as detailed in the Terms of Reference including but not limited to Economic Feasibility Studies, all Technical Studies, Field Investigations and related services. In carrying the work, KIRI shall co-operate fully with the concerned agencies of the Government of Kenya, in particular the Directorate of Highway Planning & Design of the Kenya National Highways Authority, Ministry of Transport, Infrastructure, Housing and Urban Development (MoTIHUD), County and National Governments, Ministry of Lands amongst others. KIRI shall provide the necessary support services related to and necessary for the completion of the assignment.

KIRI Consult Limited (a reputable firm of NEMA certified Environmental Experts) was commissioned by the Government of Kenya through the Kenya National Highways Authority (KeNHA) (hereafter referred to as the Proponent) to carry out the consultancy services. The services include Environmental and Social Impact Assessment study of Feasibility Study, Preliminary and Detailed Engineering Design.

Key Objective of Environmental and Social Impact Assessment (ESIA)

The main objective of the ESIA study is to predict, assess, and analyse the possible positive and negative environmental and social impacts that are expected during the construction, operation and decommissioning phases of the project. This will be done with the aim of proposing the possible mitigation measures for the highlighted negative impacts. This is in line with ensuring that the development does not impact negatively on the environment in terms of social, health, economic and physical (soil, water, plant and animals) state of the project site. The exercise will be carried out in accordance with the National Environmental Management and Co-ordination Act (EMCA), 1999 Schedule II including the Environmental (Impact Assessment and Audit) Regulations, 2003, IFC Environmental and Social Performance Standards and Equator Principles.

The specific objectives are:

- Prediction and evaluation of potential environmental impacts of the project, and propose workable mitigation measures for the significant negative impacts of the project on the environment.
- Facilitation of consultative public participation and incorporate expressed views into the study report.
- Preparation of a detailed Environmental Monitoring Plan for the proposed project.
- Preparation of a detailed Environmental and Social Management Plan (ESMP) for the proposed project.

Study methodology

Methodology of Environmental and Social Impact Assessment in line with the Environmental Management and Coordination Act CAP 387 of 1999 and (Amendment 2015). Various stages were undertaken to realize this report. The stages are as detailed.

- Environmental screening;
- Environmental scoping;
- Desktop study;
- Site assessment;
- Public participation;
  - Key Stakeholder Meeting.
  - Public Meetings.
  - Socio-economic/Household survey.

Legal, Administrative and Institutional Framework

Some of the key policies in which the proposed project will operate include;

- The National Biodiversity Strategy of 2000;
- Sessional Paper No. 3 of 2009 on National Land Policy;
- Sessional Paper No. 8 of 2012 on National Policy for the Sustainable Development of Northern Kenya and other Arid Lands;
- Wildlife Policy of 2011;
- Wetlands Policy of 2013;
- Physical Planning Policy;
- Occupational Health and Safety Policy of 2012;
- HIV/AIDS Policy of 2009;
- The Kenya National Climate Change Response Strategy of 2010;

Some of the relevant legislations to the proposed project;

- Environmental Management and Coordination Act (EMCA, Cap 387);
- The Wildlife Management and Conservation Act 2013;
- Forest Conservation and Management Act, 2016;
- The Water Act 2016;
- The Agriculture, Fisheries and Food Authority Act of 2013;
- Natural Resource (Benefit sharing Bill), 2014;
- Energy Act, 2006;
- Land Act, 2012;
- The Land Registration Act, 2012;
- The National Land Commission Act, 2012 (No. 5 of 2012);
- Community Land Act 2016;
- The Environment and Land Court Act, 2011;
- The County Governments Act 2012;
- Occupational Safety and Health Act 2007;
- The Public Health Act (Chapter 242) of Revised Edition 2012;
- The Valuers Act (Cap 532), 1985 Physical Planning Act (Cap. 286);
- The Penal Code (Cap. 63);

- The Employment Act, 2007;
- Work Injury Compensation Benefit Act (WIBA) 2007;
- Public Roads and Roads of Access Act Cap 399;
- The Traffic Act Cap 403;
- Building Code 2009;
- The Kenya Roads Act, 2007;
- HIV / AIDS Act, 2006;
- Urban Areas and Cities Act No 13 of 2011;
- The Kenya Roads Board Act, 1999;
- The National Gender and Equality Act, 2011;
- The Sexual Offences Act, 2006 and its amendment 2012;

National institutional framework relevant to the project includes;

- The National Environment Management Authority;
- KeNHA;
- Ministry of Transport, Infrastructure, Housing and Urban Development (MoTIHUD);
- The Kenya Roads Board;
- Kenya National Highways Authority (KeNHA).

Some of the relevant International conventions and guidelines that the project will operate in include;

- Vienna Convention on the Protection of the Ozone Layer;
- United Nations Convention on Biological Diversity (UNCBD);
- African Convention on the Conservation of Nature and Natural Resources;
- Convention on International Trade in Endangered Species;
- The World Commission on Environment and Development (The Brundtland Commission of 1987);
- The Ramsar Convention for the conservation and sustainable utilization of wetlands;
- The 1992 United Nations Framework Convention on Climate Change (UNFCCC);
- The Paris Agreement;
- Rio Declaration on Environment and Development;
- Earth Summit on Sustainable Development Agenda 21;
- International Labour Organization;
- Sustainable Development Goals (SDGs).

Potential Impacts

Potential impacts were analysed and the following are the potential positive impacts identified:

- Creation of employment opportunities;
- Increased business opportunities;
- Improved social infrastructure;
- Faster means of transport;
- Cheap / affordable fares;
- Easy and fast movement of people;
- Easy and fast movement of goods;
- Interaction of people from different communities;
- Growth of towns;

- Potential for increased economic activities;
- Transfer of skills;
- Improved security.

The potential negative impacts identified include;

- Increased Accidents;
- Impact on water resources;
- Noise pollution;
- Dust generation;
- Waste disposal and spoils;
- Loss of vegetation cover;
- Loss of pasture for livestock and wildlife;
- Displacement of local communities;
- Disruption and loss of businesses;
- Cultural erosion;
- Increase in the spread of STD, HIV and AIDS;
- Effect on soil and air;
- Effects of sourcing of construction materials;
- Health and safety concerns.

Environmental and Social Management Plan

The Environmental and Social Management Plan (ESMP) is prepared to show how site specific concerns and mitigation measures are addressed through the construction and operation phases of the project.

The objectives of the ESMP are:

- To bring the project into compliance with applicable national environmental and social legal requirements;
- To outline the mitigating/enhancing, monitoring, consultative and institutional measures required to prevent, minimize, mitigate or compensate for adverse environmental and social impacts, or to enhance the project beneficial impacts.

In order to ensure the sound development and effective implementation of the ESMP, it was necessary to identify and define the responsibilities and authority of the various persons and organizations that will be involved in the project.

The following entities will be involved on the implementation of this ESMP:

- National Environmental Management Authority (NEMA);
- The contractor;
- Kenya National Highways Authorities (KeNHA);
- Resident Engineer;
- Environmental and social officer;
- Kenya Forest Service (KFS);
- Kenya Wildlife Service (KWS).

Conclusion and Recommendations

The ESIA study has established that the proposed development project by KeNHA is a worthy investment by the proponent and will contribute significantly to the economic development of the country. This will be achieved through the prior discussed positive impacts namely; growth of the economy, boosting of the informal sector during the construction phase, provision of market for supply of building materials, employment opportunities, increase in government revenue and optimal use of land among others. The studies conducted on the proposed upgrading of Baragoi – North Horr (217Km) shows that indeed the project will pioneer development in the part of Kenya.

However, the ESIA study has established that the proposed project will also have some negative impacts. The negative environmental impacts that will result from establishment of the proposed project which include possible livestock-vehicular accidents, hydrology and water quality degradation, noise pollution, dust emissions, solid waste generation, increased water demand, increased energy consumption, generation of exhaust emissions, workers accidents and hazards during construction, possible exposure of workers to diseases, increased storm water among others can however be sufficiently mitigated.

The proponent of the proposed project shall be committed to putting in place several measures to mitigate the negative environmental, safety, health and social impacts associated with the life cycle of the project. It is recommended that in addition to this commitment, the proponent shall focus on implementing the measures outlined in the Environmental Management and Monitoring Plan as well as adhering to all relevant national and international environmental, health and safety standards, policies and regulations that govern establishment and operation of such projects in Kenya. It is expected that the positive impacts that emanate from such project shall be maximized as much as possible as exhaustively outlined within the report.

Considering the positive socio-economic and environmental benefits which will accrue because of the proposed development and the ESIA study having found no major impacts to arise from the development, it is our recommendation that the project be allowed to proceed on the understanding that the proponent will adhere to the mitigation measures recommended herein and will further still implement the proposed Environmental Management and Monitoring Plan. Kenya as a country has a big shortage of such road project developments especially in the Kenyan side. Therefore, the construction of the proposed project goes a long way in solving part of the existing challenges experienced on road transportation sector.

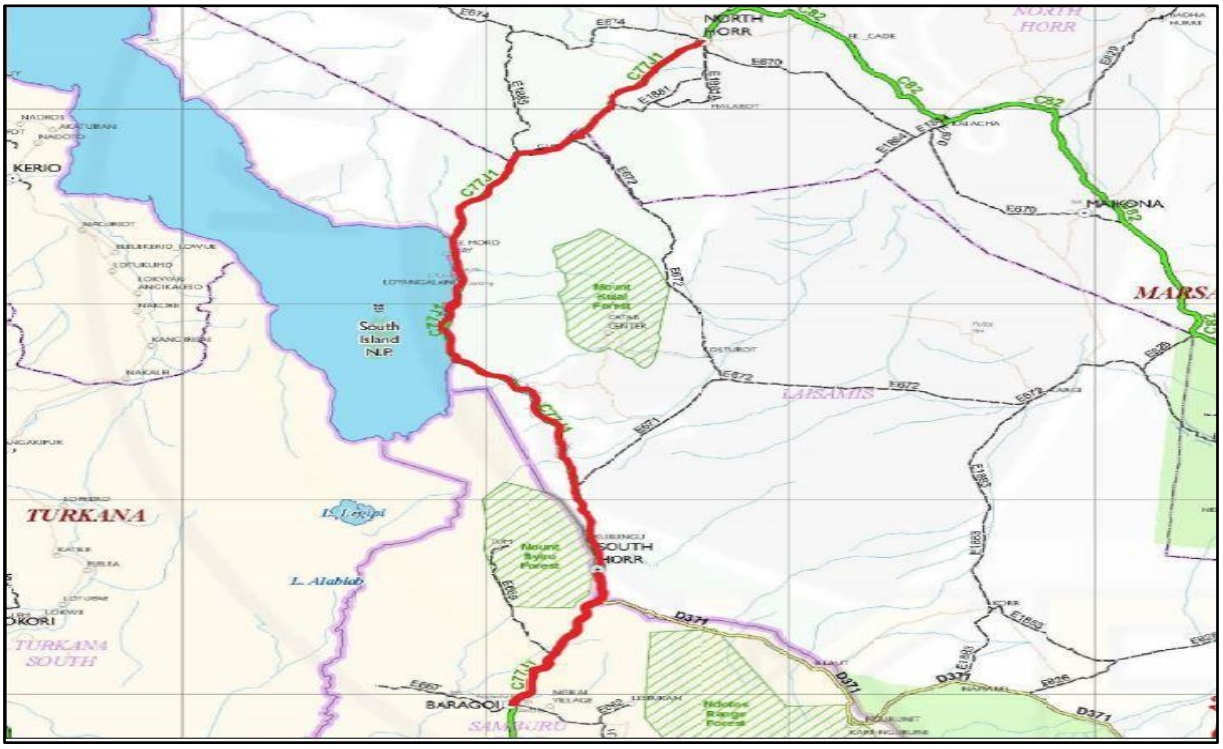
1. INTRODUCTION

1.1 Project Background

The Government of the Republic of Kenya (GoK) has earmarked funds through the Development Vote for use in engaging the services of a Consultancy Firm to undertake Feasibility study, Environmental and social Impact, Preliminary and detailed engineering design of Constructions of Baragoi – North Horr (A4) Road. Through its implementing agency, the Kenya National Highways Authority (KeNHA), GoK has contracted KIRI Consult Ltd to render all technical support services relevant to this exercise. KIRI Consult shall perform all assignments as detailed in the Terms of Reference including but not limited to Economic Feasibility Studies, all Technical Studies, Field Investigations and related services. In carrying the work, KIRI shall co-operate fully with the concerned agencies of the Government of Kenya, in particular the Directorate of Highway Planning & Design of the Kenya National Highways Authority, Ministry of Transport, Infrastructure, Housing and Urban Development (MoTIHUD), County and National Governments, Ministry of Lands amongst others. KIRI shall provide the necessary support services related to and necessary for the completion of the assignment.

1.2 Project Location

The project is located in Northern Kenya and Shores of Lake Turkana. It crosses two Counties i.e. Samburu and Marsabit.



Map 1: A4 (Formally C77) Alignment Map

The alignment runs from Baragoi at point **N 01°46'26.2"; E 036°47'40.4"** to the intersection with road C82 at **N 03°19'10.9"; E 037°04'29.5" (***Coordinate: PS, Datum: WGS 84***).** The road links several towns centers and villages such as Baragoi (**1°47'36.9"N 36°47'56.6"E**), Loruko

(**1°58'32.0"N 36°53'24.7"E**), LMerim (**2°01'48.7"N 36°55'16.3"E**), South Horr (**2°05'52.5"N 36°55'04.5"E**), Kurungu (**2°09'40.2"N 36°54'32.6"E**), Anderi (**2°13'18.5"N 36°54'06.9"E**), Ntaliatiani (**2°15'42.8"N 36°53'16.4"E**) Sarima (**2°30'48.4"N 36°48'24.2"E**), Loiyangalani (**2°45'28.1"N 36°43'02.7"E**), El molo (Layieni/Komote **2°45'28.1"N 36°43'02.7"E**), Gus (**3°03'46.2"N 36°49'37.1"E**), North Horr (**3°19'20.1"N 37°04'06.0"E**).

The project alignment is characterized by topographic variations with hills, valleys, plains being a notable. The area is Semi-arid and becomes Arid as you go further North. The road starts on a North Easterly direction from Baragoi with sharp terrains for a distance up to El Merim, 34Km away. From El Merim, the direction is Northerly into South Horr. From South Horr, the road takes a North Westerly direction up to point **2°35'51.2"N 36°42'03.5"E, 0+111Km,** at the age of Lake Turkana and a few Kilometers past Lake Turkana Wind Power Project Site. From this point the Road takes a Northerly Direction along the lake covering a distance of **32Km** to point **2°51'26.2"N 36°42'14.4"E** from where it takes a North Westerly Direction up to North Horr, **2°35'51.2"N 36°42'03.5"E, 0+217Km.**

1.3 Project Scope

The Proposed Road Project is to entail the following activities

- Carry out environmental and social impact assessment to investigate and mitigate probable project effects on the environment and the built environment;
- Carry out, Aerial, Topographical Survey, Traffic Survey, Materials and Soil investigations, hydrology and drainage investigation for purposes of Geometric, Pavement, Drainage and Bridge Design;
- Review and identify properties that will need to be acquired for effective execution of the project;
- Prepare Cost Estimates and Tender Documents for the purposes of bidding.

1.4 Justification of the Project

Samburu and Marsabit Counties are considered the most marginalized counties in the country. With a population largely dominated by pastoralist and characterized by community clashes, the development of this project comes as good news. The tourism, mining and Energy investment potential of the area is very high and this project will open up the area to the rest of the country. There will be increased trade and reduced business costs hence a definite growth will be spurred in the area. In relation to this, creation of employment opportunities will generate income and wealth as well as necessitate security within the area. Development of this project is the key to opening up the area and ensuring equitable economic transformation across the nation.

Critical to this area is health and health services, which is very much hampered by the poor road network. Therefore, the project development carries a good measure of benefits upon effective mitigation.

1.5 ESIA objectives

1.5.1 Broad Objective

The Baragoi - North Horr road project falls in the category of projects listed in the second schedule of the EMCA CAP 387 that require an EIA to be done before their implementation. This Environmental Social Impact Assessment (ESIA) report has been prepared to identify significant linkages of the road

project to the environmental and social settings of the project. The ESIA report provides management plans and intervention actions that are based on physical environmental and social features, defined timelines and implementation cost elements. The management actions are also based on design concepts and principles. This ESIA report will also be used as a tool to enumerate the anticipated environmental impacts and to evaluate their magnitudes. The report will also suggest the mitigation measures for the identified negative impacts as well as generate an Environmental management and monitoring plan which will inform the process of decision making on the project.

1.5.2 Specific Objectives

- To collect and document environmental and socio – economic baseline data for the project;
- To identify potential environmental impacts of the proposed Baragoi – North Horr road project;
- To assess the significance of these impacts;
- To assess the relative importance of the impacts of alternative plans, designs and sites;
- To propose mitigation measures for the significant negative impacts of the project on the environment;
- To establish appropriate mitigation cost for environmental and social interventions;
- To generate baseline data for monitoring and evaluation of the efficiency of those measures being implemented during the projects' cycle;
- To present information on the impact of alternatives; and
- Establish environmental and social management and monitoring protocol for implementation.

1.6 Justification of the ESIA

The implementation of the proposed project will have both socio-economic and environmental impacts on the project area. In order to alleviate any detrimental effects of the project, there is need to assess possible impacts of the development on the environment and the socio-economic attributes of the project area. Environmental Impact Assessment will be conducted in accordance with the Client Guidelines and Environmental Management and Co-ordination Act (EMCA), 1999 Schedule II including the Environmental (Impact Assessment and Audit) Regulations, 2003.

Due to the likely socio-economic impacts of the project, our Environmental Specialist and Socio-Economic Specialist will also collect socio-economic data to support the Environmental Impact Assessment and also to be used for Economic Evaluation of the Project. They will be assisted by Field Assistants and a group of Enumerators especially in the process of acquiring the primary data in the field.

The execution of the assignment will be carried out during the preliminary design of the Project Roads to ensure that the designs produced comply with environmental requirements and take into account socio-economic status in the area. The outcome of the Environmental Impact Assessment will be used to moderate the Engineers' Designs to ensure that they are in harmony with the environmental and socio-economic attributes of the project area. This approach will enhance the protection of the environment and the local community from negative effects of development.

1.7 Terms of Reference

The following broad terms of reference applies to the project:

- Description of the proposed location of the project;
- A concise description of the national environmental legislative and regulatory framework, baseline information, and any other relevant information related to the project;
- The objectives of the project;
- The technology, procedures and processes to be used, in the implementation of the Project;
- The materials to be used in the construction and implementation of the project;
- The products, by-products and waste generated by the project;
- A description of the potentially affected environment;
- The environmental effects of the Project including the social and cultural effects and the direct, indirect, cumulative, irreversible, short-term and long-term effects anticipated;
- Alternative technologies and processes available and reasons for preferring the chosen technology and processes;
- Analysis of alternatives including project site, design and technologies and reasons for preferring the proposed site, design and technologies;
- An environmental management plan proposing the measures for eliminating, minimizing or mitigating adverse impacts on the environment, including the cost, time frame and responsibility to implement the measures;
- Provision of an action plan for the prevention and management of foreseeable accidents and hazardous activities in the course of carrying out activities or major industrial and other development projects;
- The measures to prevent health hazards and to ensure security in the working environment for the construction workers in case of emergencies;
- An identification of gaps in knowledge and uncertainties which were encountered in compiling the information;
- An economic and social analysis of the project;
- An indication of whether the environment of any other state is likely to be affected and the available alternatives and mitigating measures; and
- Such other matters as the Authority may require.

A detailed and approved Terms of Reference for the ESIA is attached as in **Appendix section**

1.8 The Environmental Impact Assessment Team

Table 1-1: EIA Project Team

NAME	NEMA Reg No.	Responsibilities
Julius Musyoka Musili	Lead Expert Reg. 3074	Project review, liaisons and quality assurance.
Charles Lwanga Muyembe	Lead Expert Reg. No 1283	Policy, Flora, Fauna and Community sensitization
Jason Opanda	NEMA Associate Expert No. 8304	Site survey, data collection and report writing
Philip	Geologist Registration Board- Reg. No. 210; NEMA Expert Reg. 10449	Geology, Hydrogeology data collection, analysis and reporting
Evelyn Mbithi	Sociologist	Social economic analysis, data collection , report writing

2. METHODOLOGY

This section outlines the Methodology of Environmental and Social Impact Assessment in line with the Environmental Management and Coordination Act CAP 387 of 1999 and (Amendment 2015). Various stages were undertaken to realize this report. The stages are as detailed.

2.1 Environmental screening

Owing to the nature of the project and the provisions of EMCA CAP 387 of 1999, Second Schedule, Part 3 (a), this project is required to undergo an ESIA study to ascertain the impacts of the Project in the area.

2.2 Environmental scoping

In the Scoping Phase, key issues to be investigated and assessed during the subsequent phases of the process were identified, and the range and extent of the studies to be conducted determined. The primary Project stakeholders were also being identified during this Phase.

The key objectives for the Scoping Phase were to:

- Identify, materialize harmony with the affected / interested stakeholders and inform them of the Project and the EIA process;
- Provide stakeholders with the opportunity to identify any issues and concerns associated with the Project;
- Identify areas of likely impact and environmental issues that may require further investigation in an EIA; and
- Determine the need for specialist baseline and impact assessment studies in response to initial stakeholder input.

Out of this stage, a Terms of Reference was generated, submitted to the client and NEMA on 21st December, 2018 and consequently approved on 24th December 2018. Refer to Error! Reference s ource not found..

2.3 Desktop study

A desktop study was conducted in order to review available published (like policies and legislations) and unpublished reports, County Integrated development plans and maps and information gathered from reconnaissance in order to compile relevant baseline biophysical and socio-economic information about the study area.

The Government's policy on road transport is to provide efficient and reliable road network to spur Socio-economic development and improve security. Under the administrative framework, the National Environment Management Authority (NEMA) is responsible for ensuring that Environmental Impact Assessments (EIAs) are carried out for new projects and environmental audits on existing facilities as per the requirements of the Environmental Management and Coordination Act (EMCA, Cap 387). These requirements are stipulated in the Environmental Management and Coordination Act (EMCA, Cap 387) and EIA/EA Regulations 2003.

The biophysical information was also compiled on environmental aspects such as flora, fauna, conservation, topography, drainage, soils, geology, hydrogeology, climate and vegetation, while the socio-economic environment study compiled information on aspects such as population, land use and land tenure. This is outlined under the Baseline Information Chapter.

2.4 Site assessment

Site assessment (physical inspection) was carried out between 14th January and 30th January 2019.The assessment entailed observation on biophysical and socio-economic environment. From this, details of the positive and negative effects of the development of the project on the environment were identified and appropriate recommendations outlined to minimize any undesirable effects resulting from improvements of the road. This study was conducted in accordance with International Environment and Social Safeguards and the Environmental Management and Coordination Act of 1999 schedule II including the EIA and audit regulation of 2003

The analyses included, but not limited to the following factors:

- The role of the project in the development plans at national and regional level;
- Preservation of areas and land use of particular value including agricultural and natural conservation areas, forests and other important natural resources, cultural and historic sites, etc.;
- Disturbance of vegetation and plans for re-vegetation and conservation of biodiversity;
- The prevention of soil erosion and sedimentation;
- The presentation of health hazards arising from ponding water and pollution of water courses and/or sources;
- Measures for the rehabilitation of sources of construction materials, borrow pits and quarries;
- Health and sanitation for the road construction labour units;
- The avoidance of and reduction of visual intrusion;
- Assessment of the impact on demographic factors including the prevention of undesirable roadside developments, and recommended regulations and measures to limit negative impact on adjacent communities and areas;
- Baseline Characteristics – the existing conditions before the Project is undertaken and any effects;
- Identify sources of impacts and the impacts themselves that are generated by any aspect of the Project;
- Rate impacts before any mitigation (for negative impacts) or enhancement (for positive impacts) is implemented;
- Suggest mitigation and enhancement measures to address the impact, as appropriate; and
- Rate impacts after mitigation to produce a “residual” impact rating.

This has been accomplished. See Error! Reference source not found. and Error! Reference source no t found..

2.5 Public participation

Public participation by conducting interviews, discussions and public meetings with key stakeholders including members of the community affected by the project to obtain their views on the impacts of the project and possible mitigation measures. This is as per the Kenyan Constitution, EMCA Cap 387. The public consultation and participation was conducted through:

- Household socio-economic survey;
- Key stakeholder interviews;
- Key stakeholder Meeting (Maralal County Commissioner' Offfice and Marsabit County Commissioner' Office);
- Public Meetings;
- Focused Group Discussions.

2.5.1 Key Stakeholder Meeting

Key Stakeholder Interviews were conducted on 15th of January 2019 at Samburu County Commissioner's office and 29th January 2019 at Marsabit County Commissioner's office. Some of the key people consulted include; Member of Parliament (MP), County Commissioners, Deputy County Commissioners, representatives from the Kenya Wildlife Service (KWS), Kenya Forest Service (KWS), Ministry of Lands, Ministry of Public Health and the Ministry of the Roads. The key stakeholder engagements were conducted to foster better and mutual understanding of public concerns as well as incorporate key stakeholders' opinions regarding the proposed road project. Below are the photos taken during the key stakeholders' engagement.

2.5.2 Public Meetings

Fifteen (15) public participation meetings were conducted along the proposed road project. The local Chief, Sub-chiefs, Sub-County Administrators and Head Men were used to mobilize the public to attend the meetings. The announcements for the meetings were made by phone calls, announcement at centres and village settlements, in places of worship and chiefs barazas. A total of **872 people** participated in the meetings. Focused Group Discussions (FGDs) were also conducted for specific groups of people such as youth, women and the elderly within the community.

2.5.3 Socio-economic/Household survey

A total of **400** Household Socio-economic survey questionnaires were administered along the proposed road project to assess the socio-economic status of the project area.

2.6 Data analysis, reporting and documentation

Upon data analysis, potential environmental impacts (both positive and adverse) were predicted based mainly on concerns raised by the public, stakeholders and expert observations on the ground and available tools. The magnitude, significance, and acceptability of predicted impacts were evaluated with a view to determining whether observed adverse impacts are significant enough to warrant mitigation. Impacts were further screened for occurrence and significance of residual (those which cannot be mitigated satisfactorily) and cumulative impacts with a view to providing a basis of making recommendations on the way forward for the project.

2.7 ESIA organization and structure

The ESIA study as proposed above culminated with production of this Study Report designed to ensure that the proposed development complies with the Environmental Management and Coordination Act (EMCA, Cap 387). The report is organization is outlined below: -

Chapter 1: Introduction - Gives Background Information to the Study Describing the Objectives and the Terms of Reference;
Chapter 2: Methodology of Environmental and Social Impact Assessment in line with the Environmental Management and Coordination Act CAP 387 of 1999 and (Amendment 2015);
Chapter 3: Project Description;
Chapter 4: Project Alternatives to the Project
Chapter 5: Outlines the Baseline Information of the Study Area;
Chapter 6: Gives the Policy, Legal and Regulatory Framework Policy, Legal, Institutional and Administrative Framework;
Chapter 7: Summarizes the outcome of the Stakeholder Engagement and Public Consultations process;
Chapter 8: Identification of Potential Impacts of the Project;
Chapter 9: Mitigation Measures and Monitoring programmes of Potential Impacts of the Project;
Chapter 10: Grievances redress mechanism;
Chapter 11: Environmental and Social Management Plan (ESMP);
Chapter 12: Concludes the findings and recaps the main recommendations.

The implementation of ESMP is a core part of the project implementation from design to completion stage and is expected to be adopted by the project stakeholders:

- The contractor;
- Supervising consultant;
- The client, Ministry's implementing team.

3. PROJECT DESCRIPTION

3.1 Project Brief

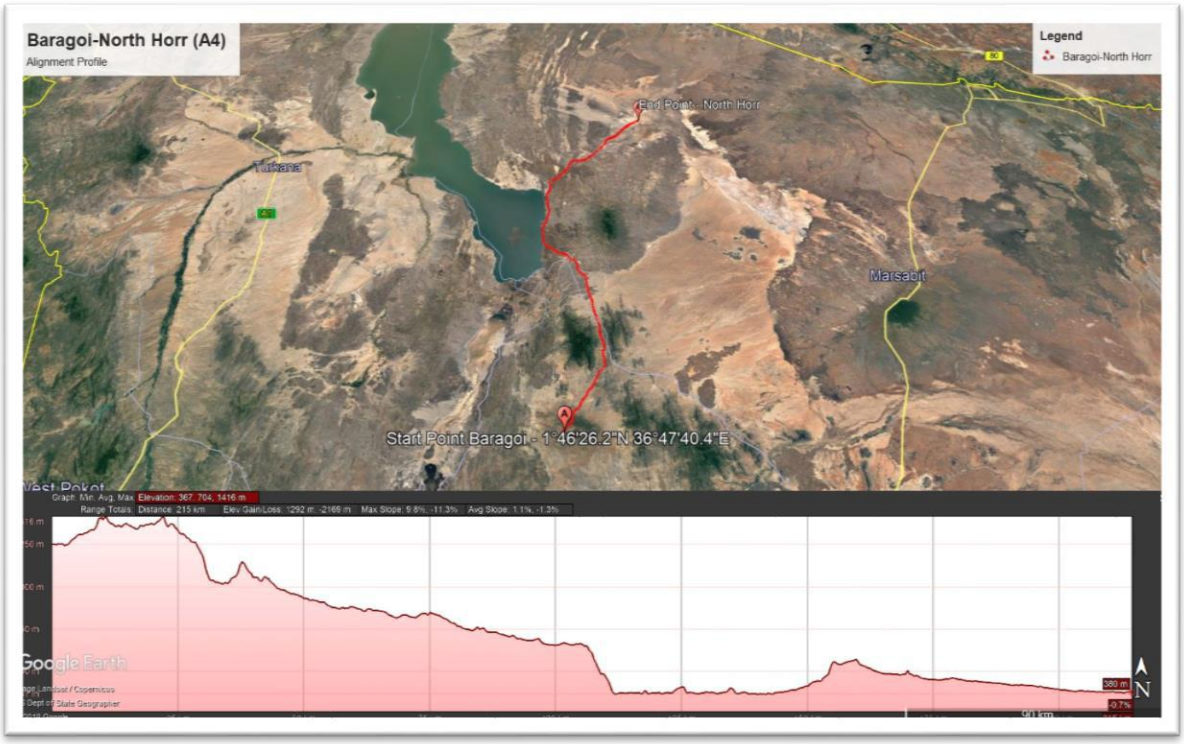
The Proposed road is located in Samburu, and Marsabit Counties. It measures approximately 217 Km. It starts in Baragoi Centre and runs in the Northerly direction and ends in North Horr Centre at the intersection joining C82 Road. The Proposed road passes through Baragoi Town Km 0+000, South Horr town at approximately Km 43+000, Loiyangalani Town at Km 130+000, Gus Town at Km 171+000, and North Horr centre at Km 217+000. Major intersections are at Km 34+000 joining the D371 Road, at Km 64+000 joining road to Laisamis, at Km 179+000 joining E672 Road and at Km 217+000 joining C82 Road.

The study for design shall incorporate design for all access roads to Government institutions including but not limited to schools, colleges, County and Sub – County headquarters and other Government offices. Major loop roads and through townships and bypasses or market centres along the road shall be included.

3.2 Project description

The existing gravel/earth road sections are constrictions with no proper engineering standards and will therefore be a big impedance to flow of the high traffic expected along the proposed project. Some of the sections of the road are expected to be totally on a new alignment. The topography of the project area can be described as follows:

- **Hilly Terrain** from Km 0+000 to km 55+000;
- **Gentle Rolling Terrain** from 55+000 to km 105+000;
- **Flat terrain** from Km 105+000 to Km 150+800;
- **Hilly Terrain** from Km150+800 to Km 171+100;
- **Flat Terrain** from Km171+100 to Km217+000.



Map 2: Map showing Project Alignment Profile

3.2.1 Road categories in the project road alignment

Table 3-1: Roads along the project alignment

Class of Road	Description
Class A:	International Trunk Roads. These are roads that are meant to link countries such as A4. They traverse, country boarders.
Class B:	National Roads. This are roads that link a number of towns and counties in Kenya and serve only domestic linkage at a national level.
Class C:	These are primary roads linking Sub-County headquarters to each other or to higher class roads e,g existing Maralal – Baragoi – Noth Horr – Marsabit road.
Class D:	Secondary roads linking locally important centres to each other or to higher class roads.
Class E:	Minor roads linking minor centres

3.3 Design Guidelines

- 2m - 4m-Edge Marker Posts;
- More 4m Guardrail-Metal Crash Beam;
- Raising of Road in Flat Areas – Flooding Areas;
- Urban Drains and Service Roads in towns.

3.4 Bridges and Culverts

The road currently has no interchanges. It is dominated by junctions. There is only one span bridge at Ch 1+900Km. There are approximately 3 box culverts along the stretch totalling and approximately 48 pipe culverts

3.5 Pavement design

The entire alignment has no pavement other than a privately done section at Lake Turkana Wind Power Project. This is a compacted soil mixed with a Resin running about 30Km in total.

3.6 Main Junction and Interchanges

The following Junctions exist along the project road:

- Km 16+500 Junction to Tum Road E669;
- Km 34+500 Junction to Ngurun Road **(2°01'56.3"N 36°55'24.0"E);**
- Km 64+400 Junction to Laisamis **(2°17'00.7"N 36°53'03.0"E);**

3.7 Access Roads

Table 3-2: List of Access Roads

No	Chainage	Name of the Institution	Distance from Existing Road (m)	Description of the access road
1	Km 0+700	AP Camp	350	The road form a loop and serves both AP camp and Kenya Police camp.
2	Km 0+900	Health Centre, North water Service Board, Baragoi Stadium, Airstrip, Baragoi Girls High School and Bandara Primary	2400	Horizontal and Vertical Alignment.
3	Km 5+700	Kenya Defence Force (Army Barracks).	1400	Has existing 2No 900mm diameter cross pipe culverts.
4	Km 38+900	Sumuruai Primary and Secondary School.	1200	The existing road is narrow, 4No Cross Pipe Culverts may be required.
5	Km 40+500	Nyiro Boys High School.	10	The gate and the fence of the school is within the road reserve of the existing road.
6	Km 44+300	Kenya Police	50	Narrow, no structure required save for access culvert.

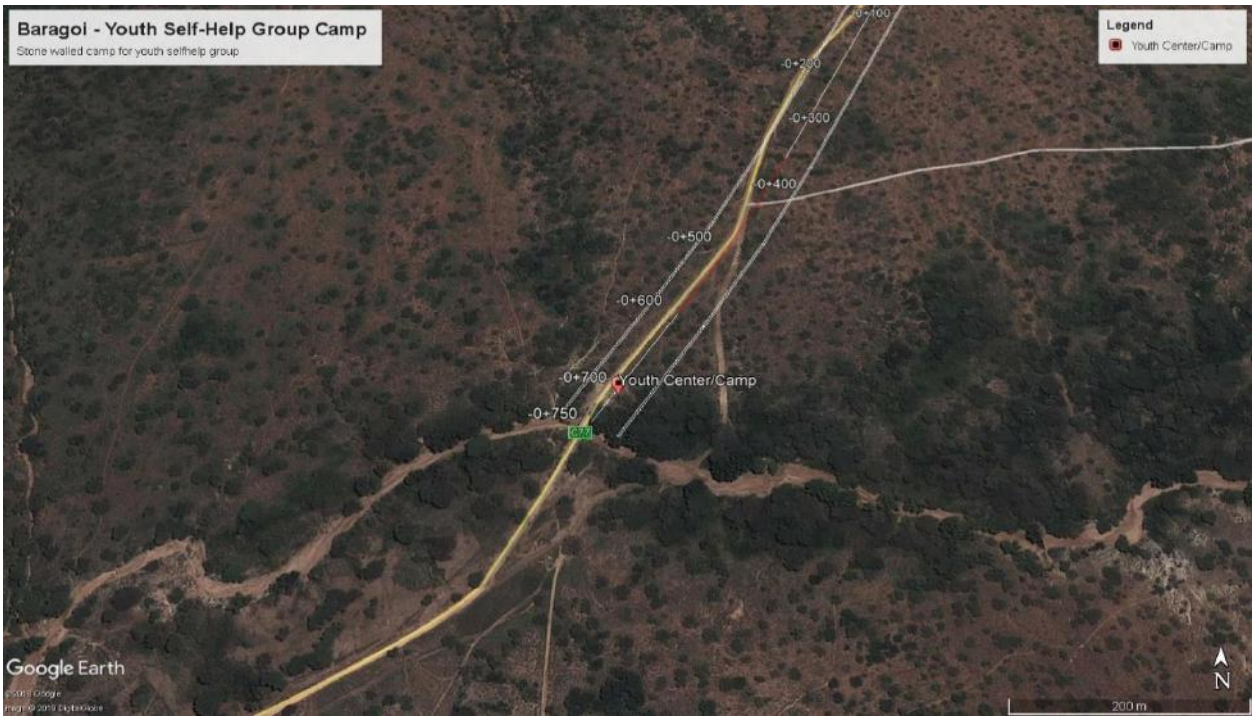
No	Chainage	Name of the Institution	Distance from Existing Road (m)	Description of the access road
7	Km 45+400	Jinja Primary School	15	Gate and fence within existing road reserve.
8	Km 50+700	Karungu Primary School and Dispensary	10	Within road reserve.
9	Km 52+200	Nyiro Girls High School	50	Narrow, no structure required save for access culvert.
10	Km 56+500	Anderi Primary School	200	-
11	Km 129+600	Loyangalani Primary and Secondary School and Administrative Police Camp	900	Access road passes through a water way, Playing field for Consaled Nursary at 0+500.
	Km 129+700	Santur Primary School	200	Road not well defined
	Km 140+500	El Molo Primary School and Dispensary	700	Road well define though narrow, no crossing structure needed save for access culvert.
	Km 171+100	Gallas Primary School and Dispensary	50	No well-defined road
Total length			**7535**	

3.8 Alignment

Map 1: Topographical Map of the Project alignment

3.9 Baragoi – North Horr (A4) Alignment Detailed with Environmental and Social Concerns

3.9.1 Baragoi



Map 3: Youth Camp - 1° 47' 37.86" N; 36° 47' 57.65" E, Ch. – Km 0+725

Mitigation

Relocation and setting up of a better Resource center. This is best done directly by the developer as opposed to conventional monetary compensation

3.9.2 Loruko

Map 4: ECD Center - 1° 58' 35.03" N; 36° 53' 24.26" E, Ch=Km 23+700

Mitigation:

Owing to the vulnerability of the community, and this being the only ECD Between Baragoi and Loruko, there is need for:

1. Re alignment to allow an effective margin from the school with adequate play space;
2. Relocation of the structure North-westerly at a convenient margin. The disruption to the routine here must be minimal hence in this case relocation should occur upon proper consultation before any construction or clearance is undertaken on this section.

3.9.3 Loruko Community settlement

The community has been staying here for quite sometime. The cluster is for security reasons. There is a good number of vulnerable persons here.

Mitigation:

There is need to move the proposed road so that the part of the community is not displaced.

Map 5: Loruko Community settlement - 1° 58' 44.06" N; 36° 53' 30.74" E, Ch=Km 24+000

3.9.4 Elmerim

Map 6: Settlements (next to ECD Center) - 2° 1' 56.93" N; 36° 55' 27.00" E, CH= 31+400

Borehole - 2° 0' 48.69" N; 36° 54' 22.44" E, Ch = Km 28+500

Settlements (next to ECD Center)

3.9.5 South Horr

Permanent Building (Sere Nyamruk)

Map 7: Permanent Building (Sere Nyamruk) - 2° 4' 25.10" N; 36° 55' 5.73" E, Ch=Km 36+200

3.9.6 St. Joseph Catholic Church and Catholic Dispensary/ Maternity

Map 8: St. Joseph Catholic Church - 2° 5' 52.00" N; 36° 54' 55.92" E, Ch= Km 39+500 and Catholic Dispensary/Maternity - 2° 5' 52.31" N; 36° 54' 59.65" E, Ch=Km 39+650

3.9.7 ECD Center/Permanent Building

3.9.8 Manyatta Settlement (Sere Nyamruk)

Map 9: Manyatta Settlement (Sere Nyamruk) - 2° 5' 5.14" N; 36° 54' 50.49" E, CH=37+700

3.9.9 Permanent & Manyatta Settlement

Map 10: Permanent & Manyatta settlement - between Km 39+900 & Km 41+300

3.9.10 Kurungu

There is a Shrine

Map 11: Shrine - 2° 1' 49.02" N; 36° 54' 22.72" E, Ch= Km 47+300

3.9.11 Manyatta Settlements

Map 12: Manyatta Settlements - Between Km 50+000 & Km 51+100

3.9.12 Anderi

Settlement

Map 13: Settlement - 2°13'12.45"N; 36°54'5.63"E, Ch= Km 53+700

3.9.13 Ntalatiani

Shrine on the road side

Map 14: Shrine on the road side - 2°15'43.79"N; 36°53'15.84"E, Ch= Km 58+600

3.9.14 Sarima

Dispensary (Not properly equipped)

Map 15: Sarima Dispensary (Not properly equipped) - 2°30'53.12"N; 36°48'23.58"E, CH= 89+800

3.9.15 Lake Turkana Point A- Clearance A

Map 16: Clearance A – (74m from the lake), 2°36'37.18"N; 36°41'58.68"E, Ch= Km 107+375

3.9.16 Lake Turkana Point e- Clearance E

Map 17: Clearance E – (112m from the lake), 2°39'25.86"N; 36°41'27.35"E, Ch= Km 112+750

3.9.17 Lake Turkana Point B - Clearance B

Map 18: Clearance B – (142m from the lake), 2°39'43.52"N; 36°41'32.58"E, Ch= Km 113+300

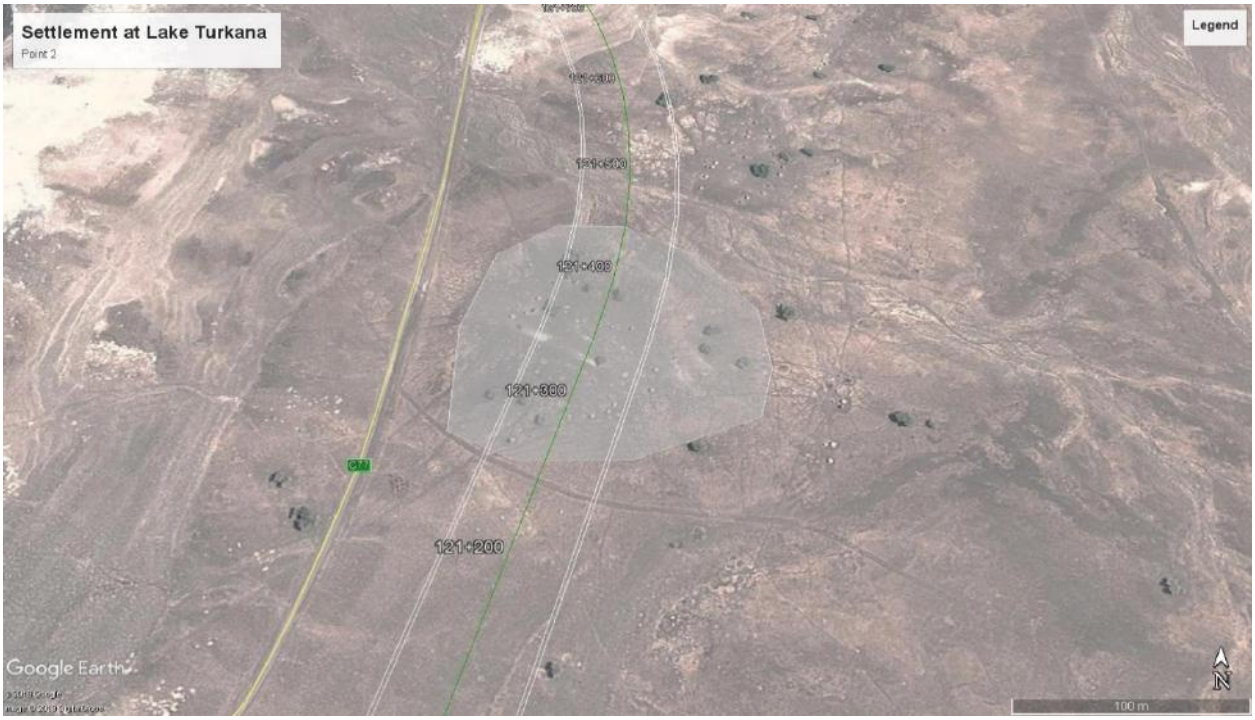
3.9.18 Settlement Point 3 - (Manyatta)

Map 19: Settlement (Manyatta) - 2°37'37.22"N; 36°42'1.88"E, Ch= Km 109+200

3.9.19 Settlement Point 1 - (Manyatta)

Map 20: Settlement (Manyatta) - 2°38'28.47"N; 36°41'56.10"E, Ch = Km 110+800

3.9.20 Settlement Point 2- (Manyatta)



Map 21: Settlement (Manyatta) - 2°43'38.61"N; 36°42'42.32"E, Ch= Km 121+300

3.9.21 Lake Turkana Point C - El Molo - Clearance C

Map 22: Clearance C – (54.3m from the lake), 2°50'27.35"N; 36°42'16.60"E, Ch= Km 134+600

3.9.22 Lake Turkana Part F - Clearance F

Map 23: *Clearance F – (94m from a water Point), 2°53'6.94"N; 36°43'10.39"E, Ch= Km 140+000*

3.9.23 North Horr region

Settlement

Map 24: Settlement - 3°14'59.02"N; 36°59'46.82"E, Ch= Km 197+100

3.9.24 North Horr - Tail Crossing Oasis (Major)

Map 25: Tail Crossing Oasis (Major) - 3°17'44.40"N; 37° 2'40.52"E, Ch= Km 205+000

3.9.25 North Horr - Conserved Oasis and Livestock watering Point

Map 26: Conserved Oasis and Livestock watering Point - 3°18'49.92"N; 37° 3'49.54"E, Ch= Km 208+100. Proximity is 29m from the road

3.9.26 Noth Horr - Suspected School (sensitive receptor)

Map 27: Suspected School (sensitive receptor) - 3°18'56.67"N, 37° 4'31.90"E, CH= 209+550

3.10 Loops

3.10.1 South Horr Loop

Map 28: A view of the Loop in South Horr

Map 29: A view of affected businesses within South Horr loop

Map 30: Affected businesses from St. Josephs' Catholic – South Horr

Map 31: Affected Home in South Horr loop

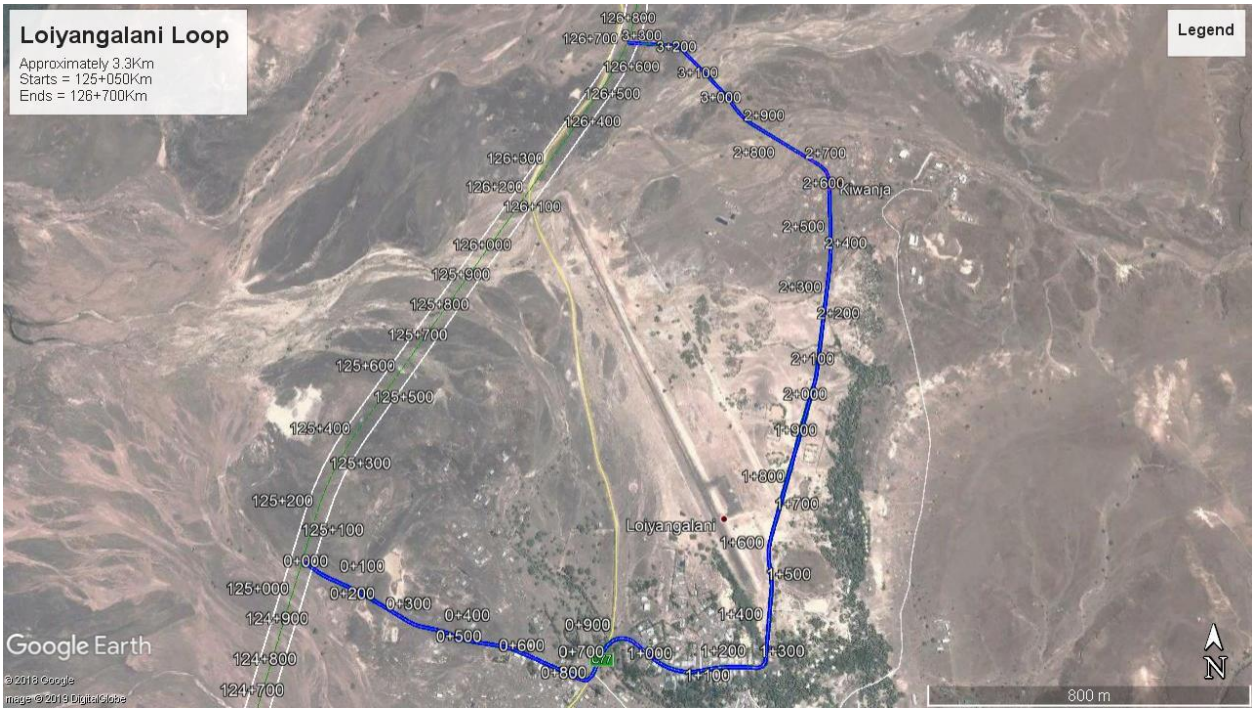
3.10.2 Kurungu Loop

Map 32: A view of the Kurungu loop

Map 33: An affected Business Kurungu Loop at Km 01+200

Map 34: A view of a shrine and Market within Kurungu Loop

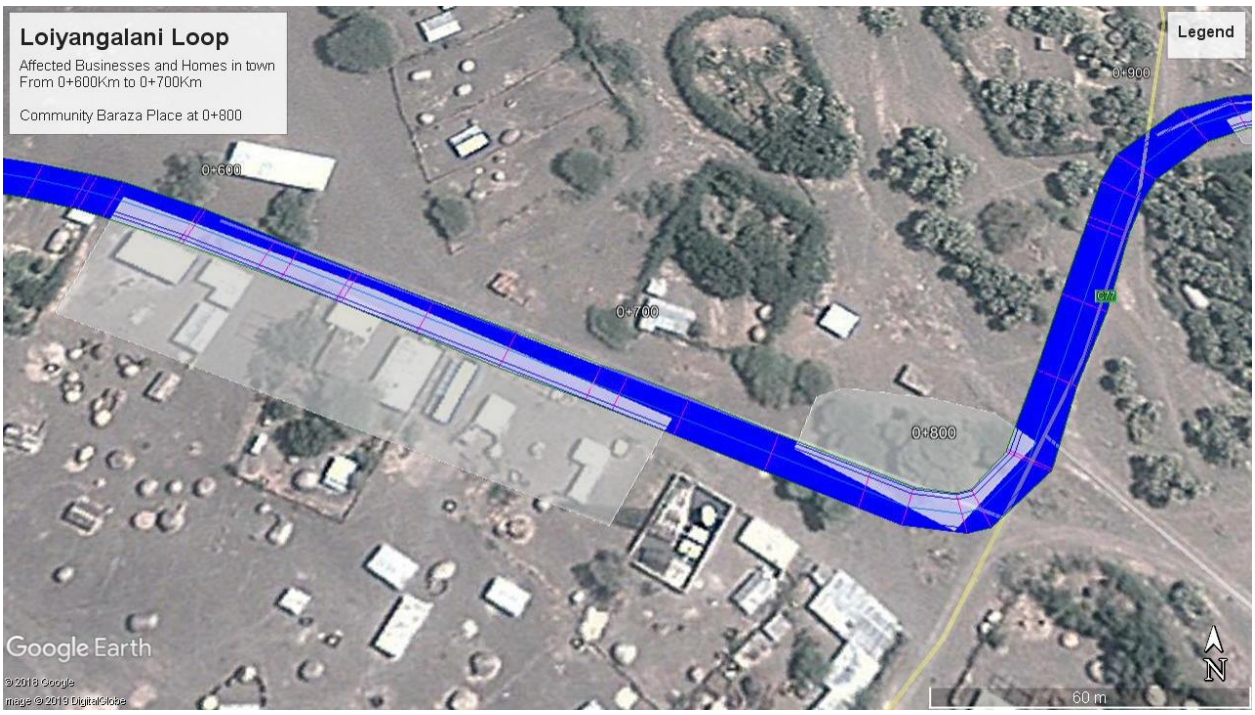
3.10.3 Loiyangalani Loop



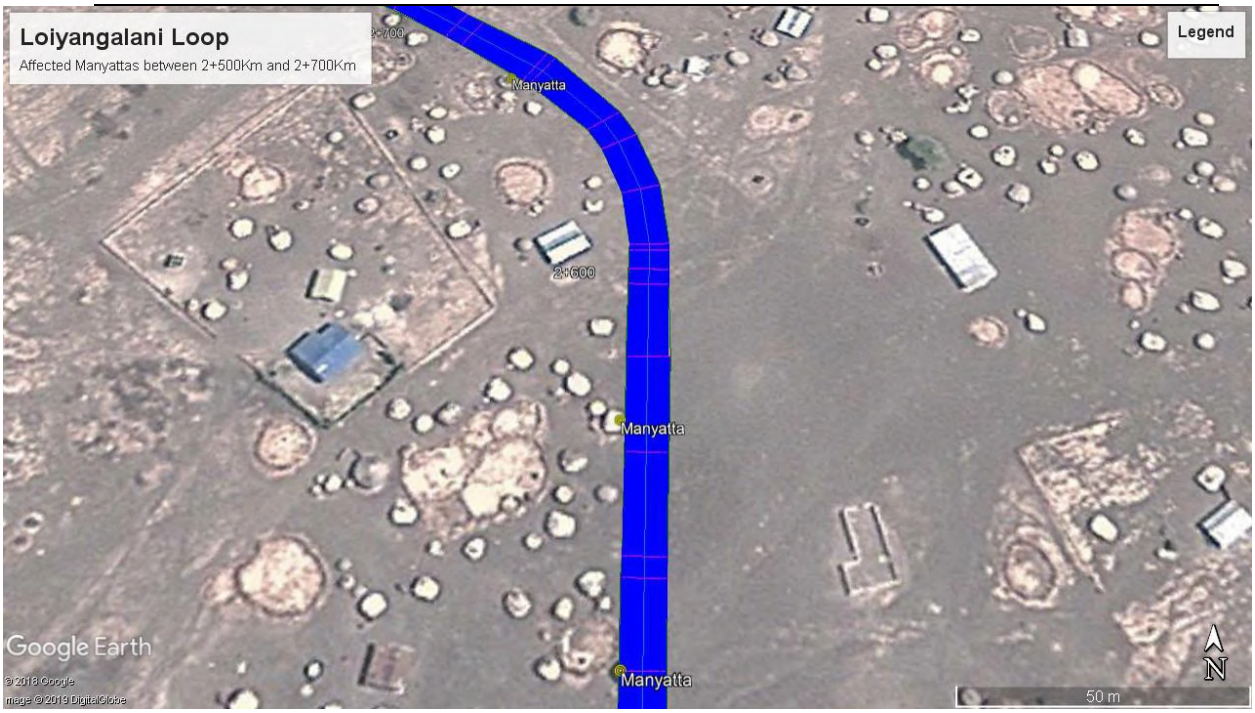
Map 35: An expanded view of the Loiyangalani Loop

Map 36: A view of an affected business within Loiyangalani Loop at Km 01+300

Map 37: A view of affected businesses and homes wothin Loiyanaglani loop between Km 01+000 and Km 01+300

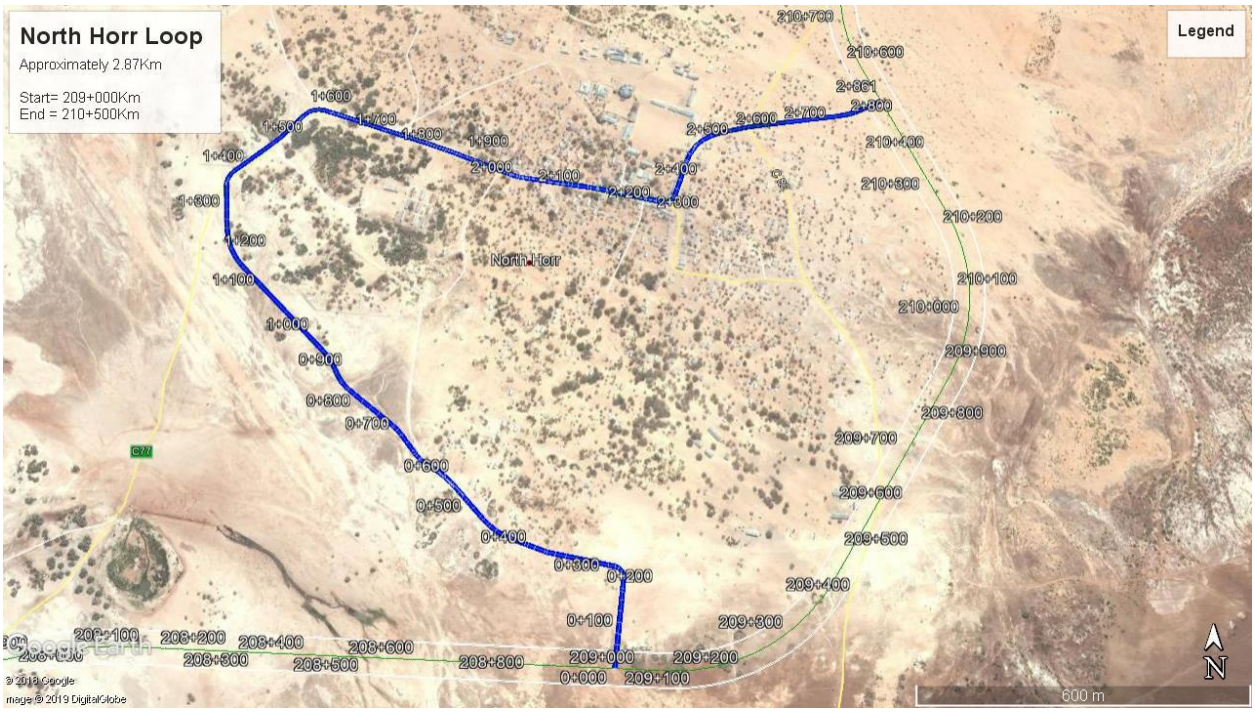


Map 38: A view of affected businesses and homes within Loiyanagalani Loop at Km 0+600 to Km 0+700km) and a public gathering space km 0+800



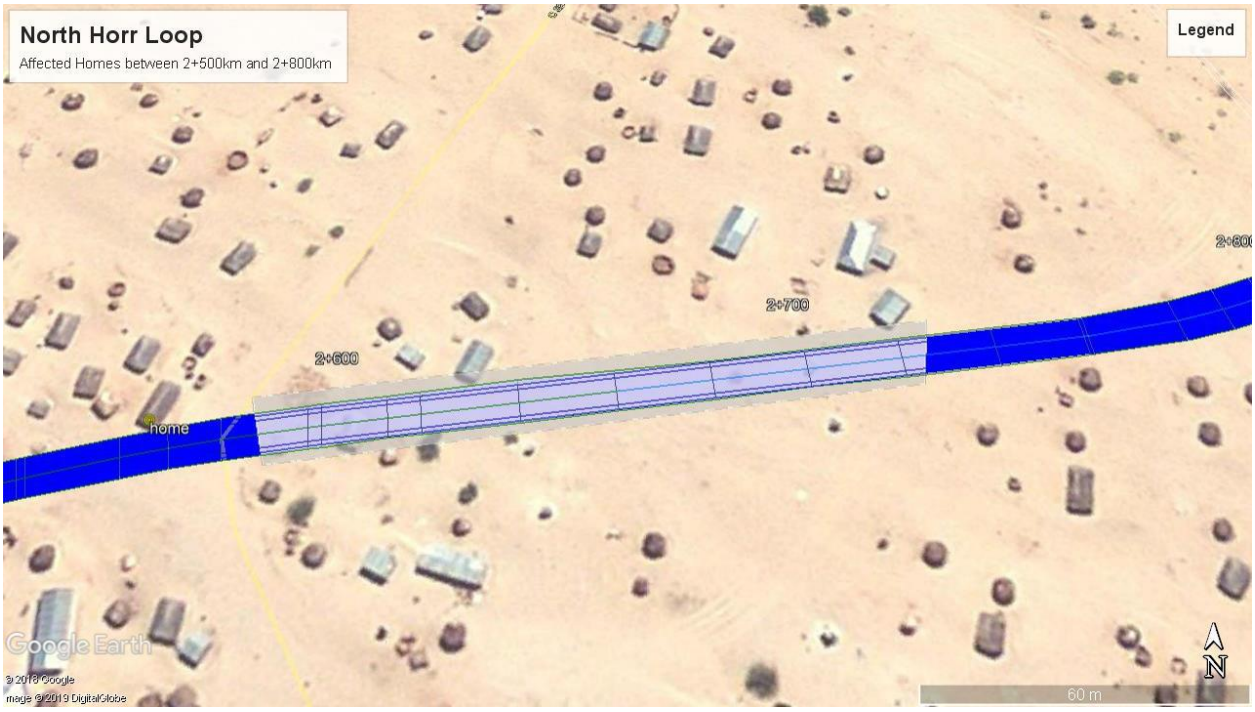
Map 39: A view of affected Manyattas (3) at Loiyangalani loop at Km 02+500 to Km 02+700

3.10.4 North Horr Town Loop

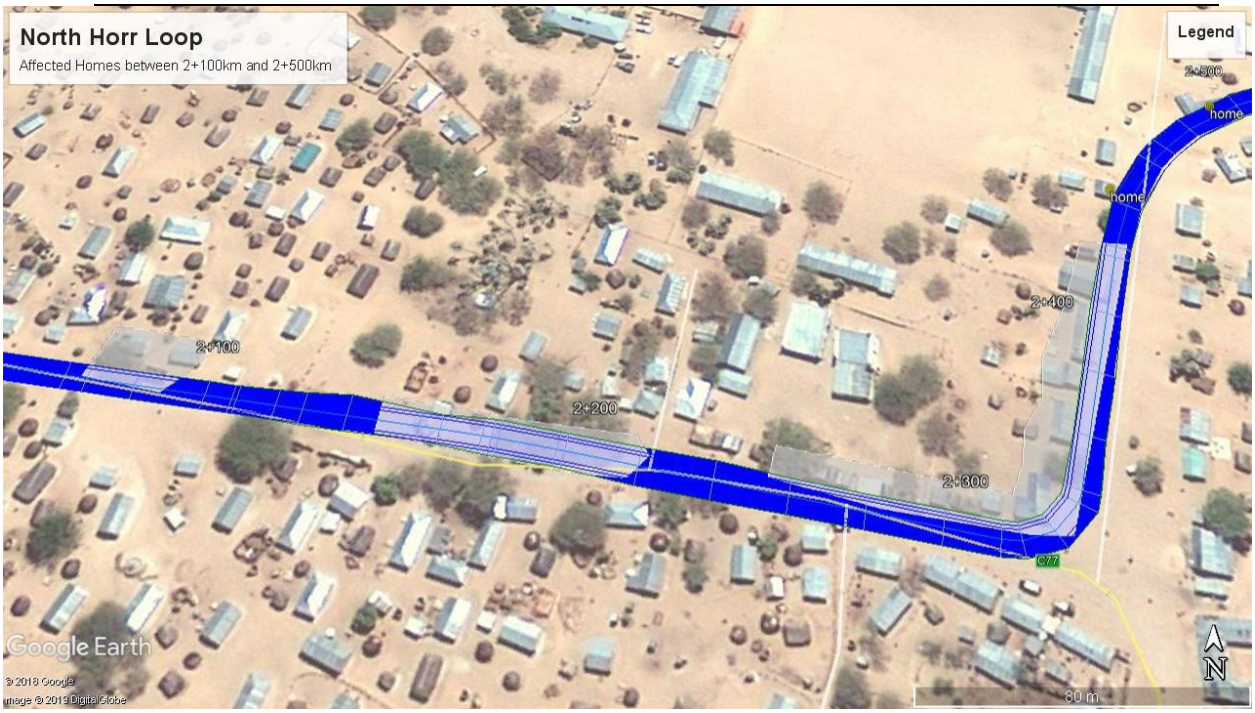


Map 40: An expanded View of North Horr Loop

Map 41: A view of an affected Homestead within North Horr loop at Km 02+000



Map 42: A view of affected Homes within North Horr loop at Km 02+500 to Km 02+800



Map 43: A view of affected homes and Business with A community gathering space within North Horr loop at Km 02+200

3.11 Quarries, borrow pits, stockpiles and spoil areas

3.11.1 Provision of land

The Contractor will make available any land for quarries, borrow pits, stockpiles and spoil areas, except for those areas in road reserves specifically approved by the resident engineer. The contractor will be entirely responsible for locating suitable sources of materials complying with the Standard and Special Specifications and for the procurement, mining, haulage to site of these materials and all costs involved therein.

Similarly, the contractor will be responsible for the provision and costs involved in providing suitable areas for stockpiling materials and spoil dumps. Should there be suitable sites for spoil dumps or stockpiles within the road reserve forming the site of the works the Contractor may utilize these subject to the approval of the Engineer.

3.12 Safety and public health requirements

This is an integral part of the project especially during the construction phase. Warning and advisory notices, drugs and condoms would be provided for throughout the project duration. The contractor shall allow for qualified professionals to conduct lectures to the workers regarding the spread of HIV/Aids.

3.13 Summary project activities

The major Works to be executed under the Contract comprise mainly of but are not limited to the following: -

- Site clearance and top soil removal.

- Earthworks.
- Preparation of the sub-grade to receive the pavement layers as per the standard specifications.
- Provision of cement improved gravel for road sub-base of the specified thickness.
- Dense Bitumen Macadam (DBM) road base of the specified thickness.
- Provision of 50mm thick asphaltic concrete Type 1 binder course.
- Provision of a single surface dressing using 14/20 mm pre-coated class 4 chippings for the carriageway and using 6/10 mm pre-coated class 4 chippings for the shoulders. The shoulders shall be constructed with the same material and thickness as for sub-base, base and surfacing.
- Construction of culverts and other drainage works.
- Protection works using stone pitching and gabions as necessary.
- Relocation of services as necessary.
- Installation of kerb stones where instructed.
- Provision of road furniture, including road marking and traffic signs.
- Landscaping including top soiling and grassing.
- Maintenance of passage of traffic through and around the works.
- Any other activity not listed above in either category but deemed to be necessary by the Engineer, shall be subject to the Engineer's formal instructions and within the mode of payment stipulated either by day works or on a measured basis.

3.14 Operation phase activities

The Contractor will be required to remedy any defects during the Defects Liability Period. The major items of work during Defects Liability period included in the contract are as follows:

- Repair of any defects on the road and road furniture;
- Removal of construction camps, removal of un-used material stockpiled on the road, tidying and general cleanness of the road and construction sites.

3.15 Decommissioning phase

Decommissioning refers to the final disposal of the project and associated materials at the expiry of the project life span. In respect to the road, decommissioning is not anticipated. However, it will be sustained in accordance to transportation demands of the project area expected at the end of construction works.

Nevertheless, after the construction period, construction equipment and dismantled camp materials will be salvaged and removed from the site by the contractor. The following is a description of some of the decommissioning activities.

1. Demolition works

The proposed project will have a lifespan of several decades save for period maintenance. Upon decommissioning, the project components including the road, pavements, drainage systems, potential parking areas and perimeter fence will be demolished. This will produce a lot of solid waste, which will be reused for other construction works or if not reusable, disposed of appropriately by a licensed waste disposal company.

2. Dismantling of equipment and fixtures

All equipment including road surface, electrical installations, furniture partitions, pipe-work and sinks among others will be dismantled and removed from the site on decommissioning of the camp site, the road and other project components. Priority will be given to reuse of these equipment in other projects. This will be achieved through resale of the equipment to other contractors or donation of this equipment to schools, churches and charitable institutions, rehabilitation of feeder roads etc.

3. Site restoration

Once all the waste resulting from demolition and dismantling works is removed from the site, the site will be restored through replenishment of the topsoil and re-vegetation using indigenous plant species or developed according to the development trend of the time.

4. Construction materials and energy used

The main sources of energy that will be required for decommissioning of the project will include electricity and fossil fuels (especially diesel). Electricity will be used for welding, metal cutting/grinding and provision of light. Diesel will run material transport vehicles and construction equipment/machinery such as bulldozers and concrete mixers. The proponent should intend to promote efficient use of materials and energy through proper planning to reduce economic and environmental costs of excavating new materials.

5. Solid waste generated

Large amounts of solid waste will be generated during decommissioning of construction phase facilities. These will include metal cuttings, rejected materials, surplus materials, surplus spoil, excavated materials, paper bags, empty cartons, empty paint and solvent containers, broken glass among others. The contractor is advised to take steps to minimize the generation of such waste and to ensure proper disposal procedures or recycling/ generated wastes.

6. Liquid effluents generated by the project

During decommissioning disconnection of pipes and other activities like washing are likely to generate effluents.

Environmental protection

The Contractor is supposed to ensure so far as is reasonably practicable and to the satisfaction of the proponent; that the impact of the construction on the environment shall be kept to a minimum and that appropriate measures as brought out in the ESMP are taken to mitigate any adverse effects during the construction. These measures shall include:

- After extraction of construction materials, all quarries and borrow pits shall be back-filled and landscaped to their original state to the satisfaction of the Engineer. Those near the project road shall be back-filled in such a way that no water collects in them.
- Spilling of bitumen, fuels, oils, lubricants and other pollutants shall be avoided and if spilt, shall be collected and disposed off in such a way as not to adversely affect the environment.
- Long traffic diversion roads shall be avoided to minimize the effect of dust on the surrounding environment. In any case all diversions shall be kept damp and dust free.

Table 3-3: below shows the various type of products, by products and waste that will be generated during the project's cycle.

Table 3-3: The products, by products and waste generated during project cycle

Project activities	Material /equipment to be used	Waste/by products generated	Disposal method
1. Planning and design Phase – No anticipated physical activities or processes			
2. Construction Phase			
Clearing the site	-Power Saws -Caterpillars	-Cut vegetation -Rock debris -Noise (by power saw)	-Soil to be used for backfilling -Wood would be used as fuel and in the construction of workers houses. -Good maintenance of machines being used.
Excavation/Earthworks including removal topsoil	-Excavation equipment's including caterpillars, haulers etc.	- Soil -Roots -Noise	- Soil to be used for backfilling and landscaping
Transportation materials maintenance equipment's	Trucks Fuel, spare parts and lubricants oil	-Fumes -Used oil, and other lubricants	-Used oil/grease to be reused for lubricating movable parts of equipment
Construction/Building Materials	-Machine cut stones -Steel -Cement - Soils -Paving slabs -Timber -Nails, galvanized iron sheets -Gravel, sand -Glass	-Stone /Rock Debris - Timber Splits - Broken Glass - Nails and Iron Sheets Cuts - Piping Remains - Plastic Waste - Oil and Greases Spills - Waste Water - Used Containers	-Soil and rock debris would be used for landscaping & back filling the reserves -Timber splits would be used for firewood and burning of tar etc. -Plastic waste should be resold to waste collectors or dumped in appropriate designated sites.

Project activities	Material /equipment to be used	Waste/by products generated	Disposal method
	-Bitumen -Oil -Water -Packaging Materials - Pipes and Pvc -Oil and Grease - Storage Containers E.g. Drums - Paints		-Metallic containers can be reused in storage of other materials or be sold to dealers. -Metallic wastes can be recycled or be sold to dealers. -Waste water can be recycled by watering diversions to control dust. -Oils and grease should be reused, be sold to dealer or be disposed off in areas.
Human Consumables	-Stationeries - Computers - Photocopiers - Clothing Materials - Vehicles - Medicines - Reagents -Food and Water	-Used paper -Obsolete/ spoilt clothing, computers, photocopiers and vehicle parts -Human waste -Expired drugs and reagents	-Sell waste paper to dealers. -All obsolete materials should be carefully sorted, stored and sold to dealers. -Septic tanks should be provided in all the workmen's camps and disposed of appropriately in designated sites.

4. PROJECT ALTERNATIVES

This Chapter looks at the project alternatives in terms of site, transport alternatives, materials and technology scale, solid waste and wastewater management options and shall involve studying design alternatives and analysing them based on the environmental costs and benefits. This shall involve studying the technology, design, capital investments, operation and maintenance requirements among others.

4.1 "Without the project" scenario

In the analysis of "without the project" scenario, the following criteria is used; past, current and future effect/ impacts of the road as currently existing, anticipated benefits of proposed upgrading plus any other considerations are analysed.

The selection of "without the project" alternative would mean the discontinuation of project proposal and result in the road being retained in its existing form. As such, this alternative is likely to have the greatest implications on the socioeconomic environment of the area and surrounding communities. Due to the proposed size of the development it is anticipated that it will open up the North Eastern part of Kenya, improve connectivity to these areas, provide opportunities for employment, benefits associated with the construction industry and potentially significant business opportunities to spring up as a result of upgrading of the Baragoi – North Horr road sections. These benefits would be foregone if the proposed project is not undertaken.

4.2 Analysis of alternative construction materials and technology

The proposed road project will be constructed using modern, locally and internationally accepted materials to achieve public health, safety, security and environmental aesthetic requirements. Equipment that saves energy and water will be given priority without compromising on cost or availability factors. The road surfaces sub-structure and road infrastructure will be made using locally sourced materials that meet the Kenya Bureau of Standards requirements.

On the alternative construction materials and technology; rainwater should be harvested and be used in construction activities and supply to labour camps for flushing toilets and other non-domestic activities. Community members should also be encouraged to harvest rain water not only to supplement the water supplied but also to help reduce pressure on the drainage structures. Heavy use of timber and wood during construction should be discouraged to minimize destruction of natural resources. The exotic tree species should be preferred to indigenous species in the construction of the project components where need will arise as they can be replanted with ease.

Asphalt mixers, crushers and other construction equipment and machinery should be incorporated with pollution control devices like dust arrestors/precipitators, emission control, noise abatement devices and desulfurization devices. The equipment and vehicles should have highest levels of combustion efficiency, capability to use cleaner fuels like biofuels and should have enhanced safety features.

4.3 Solid waste management alternatives

A lot of solid waste will be generated from the proposed development. An integrated solid waste management system is recommendable. First, the proponent will give priority to reduction at source of the waste materials. This option will demand a solid waste management awareness programme

in the management and the workers. Notices for proper waste management/handling may be posted at strategic places for the sake of visitors in the workers' camps. Secondly, Recycling, Reuse and compositing of the waste will be the second alternative in priority. This will call for a source separation programme to be put in place especially in the kitchen section. The recyclables will be sold to waste buyers within County. The third priority in the hierarchy of options is combustion of the waste that is not recyclable. Finally, sanitary land filling will be the last option for the proponent to consider.

4.4 Alternative mode of transportation

There are no viable alternatives to this road that fulfil the functions of providing relatively fast, cheap land transportation. Air, rail, and water transport are unlikely to either complement or to substitute for roads or highways in this region. There is no railway transport system close to the project area connecting the two towns and no water body that can be used as a mode of transportation in the project area. The only possible means is air transport but, this is a rather expensive alternative and cannot be used as an alternative to the road.

The road is the most important link between Nairobi, Nyahururu, Maralal, Baragoi, Loiyangalani, Gus, North Horr and Marsabit is Baragoi – North Horr road.

5. BASELINE INFORMATION OF THE PROJECT AREA

5.1 Project location

The projects run through two counties of Samburu and Marsabit, the starting point of the road is at Baragoi located in Nyiro ward, Samburu north sub County of Samburu County and extends to North Horr ward, North Horr sub county of Marsabit county.

5.1.1 Project physical location

The project starts from Baragoi in Samburu North Ward of Samburu County and extends to North Horr in (Marsabit County). The coordinates of some of the town places in which the road passes include

Table 5-1: Coordinates of the town places along the proposed road

Urban Centre	Northings	Eastings
Baragoi (Start point)	**01°46'26.2";**	**36°47'40.4"**
South Horr	**2°05'52.5"**	**36°55'04.5"**
Loyangalani	**2°45'28.1"**	**36°43'02.7"**
North Horr (End point)	**3°19'20.1"**	**37°04'06.0"**

5.2 Administration

5.2.1 Samburu County

Samburu County is administratively divided into three sub-counties, 15 wards and 108 villages as detailed in the table below:

Table 5-2: Samburu County Administrative units

Sub County	Ward	Villages
Samburu West	Lodokejek, Suguta Marmar, Maralal Loosuk Poro	Maralal Town, Lpartuk, Lkuroto, Ngari, Shabaa, Milimani, Ledero Lodo Kejek, NonKeek Longaitolia, Lmisigiyoi, Mbaringon Tinga, Malaso, Loosuk, Pura Mugur, Seketet, Siambu, Malaso Logorate, S/Marmar, Lolmolok Kirimon, Garma, Mugur,Amaiya, Longeiwan, Nasurirata Oirobi, Lmisigiyoi, Nkeju Emuny
Samburu East	Waso, Wamba West, Wamba East, Wamba North	Wamba, Matakwani Nkaroni, Resim, Silango/Nanyokie Lengei, Sessia, Lpus, Ltirim Lkisin, Gogoltim Lpashie, Koiting Raraiti, Lorrok/onyokie, Marmaroi, Swari Ngilai Central NkareNarok NgutukEng'iron, LpusLeluai, Lengusaka, Remote Sereolipi, Ndonyo Wasin Laresoro, Lerata, Archer's, Losesia
Samburu North	El Barta, Nachola Ndoto Nyiro Angata Nanyokie, Baawa	Mabati, Opiroi, Lorrok Lulu, Sioit Naibor, Barsaloi Bendera, Baragoi, Naling'ang'or Masikita, Ngilai Lesirikan, Seren, Loodua Nachola, Terter, Nakuparat Kalele, Lokorkor, Moruakiring, Suyan, Marti Latakweny, Loikumkum South Horr, Lonjorin Waso-rongai, Lkotikal, Simale,Lonyangaten, Losurkoi, Nakweei ,Parkati, Lkayo,Tuum, Ejuk,Arsim, Illaut, Nguronit.

Source: County Government of Samburu, CIDP, (2018-2022)

5.2.2 Marsabit County

Marsabit County is administratively divided into four (4) sub-counties, 20 wards as detailed in the table below;

Table 5-3: Marsabit County Administrative units

Sub County	Ward	No. of Locations	No. of Sub Locations	Total Area (Km²)
Laisamis	Laisamis, Korr/Ngurunet, Loglogo, Kargi, Loyangalani/Mt Kulal	11	30	20,290.5
North Horr	Dukana, North Horr, Dukana, Ileret,Turbi	13	18	39,248
Moyale	Butiye, Sololo, Heilu/Manyatta, Golbo, Township, Uran, Obbu	23	42	9,370.7
Saku	Karare, Mountain, Sagante/Jaldesa	11	22	2,052
Totals		**58**	**112**	**70,961.2**

Source: County Government of Marsabit, CIDP, (2018-2022)

5.3 Socio-economic characteristics of the project area

5.3.1 General characteristics of the Project Area

a) Demographic characteristics

Samburu County

According to the 2009 Population and Housing Census, the population of Samburu County was 223,947. Given a population growth rate of 4.45 percent per annum, as opposed to the national growth rate of 3 percent, the County population is projected to increase to 399,378 by 2022 and 456,418 by 2025. These changes represent about 25% population rise between 2017 and 2022.
The population consists of the Samburu, Turkana, Borana and Rendille. The projected growth in population will result to significant pressure on the available social amenities, food and job opportunities.

Table 5-4: Projections by Age Cohort

Age Cohorts	2009 Census			2017			2020			2022				2025		
	M	F	T	T	M	F	T	M	F	T	M	F	T	M	F	T
0-4	21,211	21,103	42,14		30,281	30,127	60,408	34,606	34,430	69,035	37,827	37,634	75,461	21,213	43,009	86,239
5--9	19,366	18,778	38,144		27,647	26,808	54,455	31,596	30,636	62,232	34,537	33,488	68,025	19,368	38,271	77,740
10--14	17,027	15,731	32,758		24,308	22,458	46,766	27,780	25,665	53,445	30,365	28,054	58,419	17,029	32,061	66,763
15-19	13,495	11,599	25,094		19,266	16,559	35,824	22,017	18,924	40,941	24,066	20,685	44,752	13,497	23,639	51,143
20-24	9,551	10,480	20,031		13,635	14,961	28,596	15,582	17,098	32,681	17,033	18,690	35,723	9,553	21,359	40,824
25-29	7,046	7,951	14,997		10,059	11,351	21,410	11,496	12,972	24,468	12,566	14,180	26,745	7,048	16,205	30,565
30-34	5,469	5,855	11,324		7,808	8,359	16,166	8,923	9,552	18,475	9,753	10,442	20,195	5,471	11,933	23,079
35-39	4,644	5,180	9,824		6,630	7,395	14,025	7,577	8,451	16,028	8,282	9,238	17,520	4,646	10,557	20,022
40-44	3,008	3,418	6,426		4,294	4,880	9,174	4,908	5,576	10,484	5,364	6,096	11,460	3,010	6,966	13,097
45-49	2,824	2,802	5,626		4,032	4,000	8,032	4,607	4,571	9,179	5,036	4,997	10,033	2,826	5,711	11,466

Age Cohorts	2009 Census			2017			2020			2022				2025		
	M	F	T	T	M	F	T	M	F	T	M	F	T	M	F	T
50-54	2,120	2,334	4,44		3,027	3,332	6,359	3,459	3,808	7,267	3,781	4,162	7,943	2,122	4,757	9,078
55-59	1,445	1,516	2,961		2,063	2,164	4,227	2,358	2,473	4,831	2,577	2,704	5,281	1,447	3,090	6,035
60-64	1,536	1,714	3,250		2,193	2,447	4,640	2,506	2,796	5,302	2,739	3,057	5,796	1,538	3,493	6,624
65-69	956	964	1,920		1,365	1,376	2,741	1,560	1,573	3,132	1,705	1,719	3,424	958	1,965	3,913
70-74	895	938	1,833		1,278	1,339	2,617	1,460	1,530	2,991	1,596	1,673	3,269	897	1,912	3,736
75-79	538	540	1,078		768	771	1,539	878	881	1,759	959	963	1,922	540	1,101	2,197
80+	846	1,017	1,863		1,208	1,452	2,660	1,380	1,659	3,039	1,509	1,814	3,322	848	2,073	3,797
AGE-NS	30	20	50		43	29	71	49	33	82	54	36	89	32	41	102
	112,007	111,940	223,947		159,902	159,806	319,708	182,739	182,630	365,370	199,749	199,629	399,378	112,044	228,141	456,418

Source: *Samburu County Integrated Development Plan 2018-2022*

Marsabit County

According to the County Integrated and Development Plan 2018-2022, the population of Marsabit County was 291,077 people in 2009 according to the Kenya Population and Housing census. This population is projected to rise to over 727,000 in 2050, 8 years before the year when the Demographic window of opportunity opens. The population is quite youthful with 46.7 percent of the population below age 15 and has therefore a high dependency ratio (104). However, the proportion of population below 15 years is projected to decline to 39 percent in 2030 and later to 32 percent in 2050. This reduction which is mainly as a result of decline in fertility is expected to result in the rise in proportion of the working age population to 58 percent and 64 percent in the same period. These combined effects will cause dependency ratio to steadily decline to 72 and 56 over the same period.

Table 5-5: Population Projections by Age Cohort

Age	2009			2018 (Projections)			2020 (Projections)			2022 (Projections)		
	M	F	T	M	F	T	M	F	T	M	F	T
0-4	23,406	22,229	45,635	26,081	24,024	50,105	26,675	24,392	51,067	27,278	24,792	52,069
5-9	23,886	22,939	46,825	26,804	24,949	51,752	27,415	25,330	52,746	28,034	25,745	53,779
10-14	22,625	20,952	43,577	25,391	22,784	48,176	25,970	23,133	49,102	26,556	23,512	50,068
15-19	19,504	16,228	35,732	21,991	17,761	39,753	22,492	18,033	40,525	23,000	18,329	41,329
20-24	13,439	12,043	25,482	15,132	13,203	28,335	15,477	13,405	28,882	15,827	13,625	29,451
25-29	9,505	9,280	18,785	10,763	10,173	20,935	11,008	10,328	21,336	11,257	10,497	21,754
30-34	8,034	7,509	15,543	9,092	8,231	17,323	9,299	8,357	17,657	9,509	8,494	18,003
35-39	5,704	6,021	11,725	6,439	6,578	13,017	6,586	6,679	13,265	6,735	6,788	13,523
40-44	5,279	5,101	10,380	5,977	5,606	11,583	6,113	5,692	11,805	6,251	5,785	12,037
45-49	4,109	3,753	7,859	4,637	4,104	8,741	4,743	4,167	8,909	4,850	4,235	9,085
50-54	4,027	3,739	7,766	4,549	4,092	8,641	4,653	4,154	8,807	4,758	4,222	8,980
55-59	2,519	1,963	4,482	2,835	2,142	4,977	2,899	2,175	5,074	2,965	2,210	5,175
60-64	2,694	2,499	5,193	3,050	2,742	5,793	3,120	2,784	5,904	3,190	2,830	6,020
65-69	1,506	1,149	2,655	1,722	1,262	2,984	1,761	1,282	3,042	1,801	1,303	3,103
70-74	2,031	1,882	3,913	2,296	2,065	4,361	2,348	2,097	4,445	2,401	2,132	4,533
75-79	855	726	1,581	992	814	1,806	1,014	827	1,841	1,037	840	1,878
80+	1,938	1,998	3,936	2,157	2,127	4,284	2,206	2,160	4,366	2,256	2,195	4,451
Totals	151,061	140,011	291,069	169,908	152,659	322,567	173,779	154,994	328,774	177,705	157,535	335,238

b) Infrastructure Development

Roads

Samburu County's total road network length is 1,606.6 kilometres, out of which the Tarmac road covers a length of 10 Kms, Improved (gravelled) road covers a length of 1,081 KMS and New (Opened) roads cover 515. 6Kms. Most of these are rural access roads and those linking to major urban centres within the County. The Rumuruti – Maralal- Baragoi (Road A4) is the gate way to Samburu county. The road covers a length of 116 Kms from Rumuruti to Maralal, and 108 Kms from

Maralal to Baragoi. 50 KMs of this road network is covered by Bitumen Surface the rest of the network is gravelled and earth surface.
Marsabit County's total road network length is 5,000 kilometers. This comprises of 312 km tarmacked, 580 km gravel surface and 4,108 km earth surface. However, most of the roads are impassable during rainy seasons. The completion of the North-South highway linking Isiolo - Marsabit and Ethiopia has opened up the area to investments and greatly improve connectivity and lower the costs of transporting goods and services to the County, in addition to boosting cross-border trade between Kenya and Ethiopia.

Airstrips

There are 11 airstrips in Samburu County. Wamba, Kisima and Baragoi air strips are owned by the Kenya Civil Aviation Authority (KCAA). Those owned by the County government are: Oryx, Kalama, Ngilai e Wamba, Latakweny and Kurungu. Sarara and Desert rose are privately owned airstrips. Maralal Nkuroto airstrip is not functional.
Marsabit County has eighteen airstrips located in all sub-counties. All the airstrips are in good condition and currently in use.

Information, Communication and Technology

Samburu County is served by four post offices in Maralal, Baragoi, Suguta and Wamba. There is one Huduma centre in Maralal town that offers government services and provides access to information. Local and International Television and radio stations are accessible through Cable networks such as *Zuku, Start Times, DSTV and Go TV.* The county is also served by local radio stations such as Serian FM, Watchman FM and Radio Mchungaji. The mobile network coverage in the county is 30 % compared to the national connectivity of 85%. Telekom is the sole provider of landline services. The Main Mobile Network Service Provider is Safaricom followed by Telkom, Airtel and Equitel. 3G network is only available in Maralal town while the rest of the county is on 2G and GSM. The County is yet to be connected to the National Fibre optic cable although 14 km of cables have been laid within Maralal town. The current state of ICT and especially infrastructure of the County Government is the existing LAN in various offices and an ongoing WAN connectivity to the Sub counties which has not gone live.

Marsabit County has two post offices located in Marsabit and Moyale towns with 1000 boxes installed. There are 557 landline connections while the mobile phone coverage extends to all major urban centers and many rural areas. The laying of fibre optic network in Marsabit by National Optic Fibre Backbone (NOFBI) and Safaricom has upgraded mobile service connectivity from 2G to 3G network. All major towns are connected to television services and the entire county has radio signals covered by three local FM stations – Radio Jangwani (Catholic Church), SIFA and Star radio stations running from Marsabit central. The completion of a Huduma Centre in Marsabit will continue to improve access to Information, Communication Technology (ICT) services, increase efficiency and serve as a one-stop shop for all government services.

c) Land and Land Use

Samburu County

Land in the County is either owned as registered community land (group ranches), unregistered community land (held in trust by County Government), public and private land as leasehold or

freehold. The significant land cover within the county is rangeland and gazzeted forest that occupies 15.5% of the county. On the other hand, the dominant land uses include nomadic pastoralism, wildlife conservation areas such as West Gate, Namunyak, Kalama & Samburu National Reserve, urban development and crop farming. Land in the County is categorized as per the Article 61 of Kenya's Constitution, Land Act, 2012 and Community Land Act, 2016. The first category of land that constitutes bulk of the land parcels is the community land.

The community land is further categorized as registered community land and unregistered community. The registered community land constitutes what is referred to us as Group Ranches. Presently, the County has forty-three (43) group ranches and an approximately 26, 551 registered members with the majority being found in Samburu West and East and with the least being in Samburu North. The approximate total size of registered public land excluding road reserve and un-alienated urban land is 26, 788. 18 Ha. The third category is the private land owned under freehold tenure system or under leasehold system. Most of the land owned as freehold is to be found in Samburu West Sub- county especially in the high potential agro-ecological zones of Poro 'A' & 'B", Losuuk, Suguta Marmar, Lpartuk, Loiting and Longewan sections. Those owned as leasehold, are mostly within the urban areas where public land has been allocated to private entities or individuals.

Marsabit County

Land types in the County are broadly classified as game reserve, townships, agriculture and grazing lands, with largest proportion under communal grazing areas. The absence of the national land use policy and spatial plan has encouraged the proliferation of informal settlement, inadequate infrastructure services, congestion, environmental degradation, unplanned urban centres, pressure on agriculture and grazing land and inter- tribal conflicts among others. Most of the land in the county is owned communally except a few adjudicated sections in Saku and Moyale constituency. The mean holding size of adjudicated sections is 0.8ha, which is slightly low compared to the national mean holding of 0.97ha per household.

Only about 2 per cent of the land in the county is registered. So far, the land registration covered Marsabit mountain areas, particularly, the Marsabit Township and Dakabaricha in Saku Constituency, where, so far 4,841 title deeds have been issued to land owners.
Most of the land in Marsabit County are communally owned where individual rights are not guaranteed. Absence of clear land rights remains primary disincentive for communities to embrace best land use practices in some areas and is a key driver of weak land governance. In addition, lack of title deeds is a constraining factor in the promotion of small-scale business because they cannot access credit facilities due to absence of collaterals. Since majority of the land is owned and managed communally, cases of landlessness is not prevalent.

d) Crop, Livestock, Fish Production and Bee Keeping

Samburu County

The main crops grown in the County include maize, beans, wheat, barley, pyrethrum and millet. These crops are grown in the highland areas of Poro in Kirisia Division. This is due to its fertile soils and adequate rainfall sufficient for rain fed agriculture. Ninety-two percent (92%) of the County land is rangeland suitable for livestock production and supports 202,700 cattle; 622,000 sheep; 714,000 goats; 36,100 camels and 10,000 donkeys. The main breeds of cattle kept are the local Zebu and the Borans and their cross-breeds while goat's breeds include the Small East African and Galla.

Sheep breeds include the Dorpers and the Red Maasai while camels include the Somali, the Rendille and Turkana breeds.

Beekeeping is one of the upcoming animal production systems that is being practiced in the County as an alternative production livelihood to livestock production. The famers keep bees mainly for crude honey production for use as food and source of household income. Other Bee-hive products that are equally important and can enter the food market include propolis, royal jelly and bee-collected pollen. The honey is also used in the cosmetic industry.

Fish farming is an emerging livelihood production system that the County Government through the Directorate of Livestock Production is promoting. There is a lot of potential of fish farming within the county evidenced by the presence of permanent water reservoirs in areas of Lake Turkana, Kirisia, Baawa, Poro, Loosuk, Ngilai (Wamba) and Waso.

Marsabit County

Main cash crops grown in the County include fruits and vegetables, maize, teff, beans and millet. Fruits grown include oranges, avocados, banana and mangoes. Khat (miraa) is also grown for commercial purpose in Saku Constituency and part of Moyale. Miraa is grown for commercial purposes while fruits trees are produced mainly on a small-scale and for domestic consumption and for sale in local markets. Livestock keeping is the main economic activity in Marsabit County. The main livestock kept include approximately 420,000 cattle, 2,029,490 goats, 1,851,452 sheep, 217,360 camels, 81,900 donkeys and 45,860 chicken. The main livestock products are milk, beef, mutton and camel meat
The County has a total of 5,890 assorted bee hives, with groups living on the fringes of Marsabit forest, Mt. Kulal and other isolated pockets with forest and woodlands. Bee-hive products that enter the food market include honey and propolis and bees-wax.

e) Education

Samburu County

In the County. approximately 34% of the population has the ability to read and write. The total number of Early Childhood Education (ECD) centres in the County is 529 with a total enrolment of 42,938, 24180 boys and 18,758 girls with 470 teachers translating to teacher/pupil ratio of 1:91. The teacher pupil ratio is not in line with the ECDE policy and this can be attributed to inadequate number of teachers. There are 164 Primary schools in Samburu County with 1220 teachers and a total of 49,897 pupils enrolled translating to teacher/pupil ration of 1:41. Since the introduction of free primary education and the school feeding programme, enrolment has risen. The primary school net enrolment rate is 60%. This means that about 40% of the Primary school age children are out of school in the County.

In the County, there are a total of 38 secondary schools with a total enrolment of 8,014 students and 319 teachers translating to teacher/ pupil ratio of 1:23. The low enrolment rate in secondary schools can be attributed to low transition rates from primary to secondary schools across most parts of the County. Secondary school net enrolment is 15.4%. this implies a low primary to secondary school transition rate. This low transition rate is attributed to young people in the County being faced mainly with the issues of teenage pregnancies, poor hygiene, harsh environment and HIV/AIDS. These issues are caused mostly by cultural practices, inadequate infrastructure and lack of information.

There are two institutions of higher learning in the county. These are Laikipia University Campus and the two privately owned colleges Samburu Teachers Training College and Wamba Nurse training college located in Maralal and Wamba towns respectively.

Along the Project area, education institutions in section traversed by the proposed road Project in Samburu County include; Baragoi Pri. School, Baragoi boys and girls Sec School, Sumurwai Pri. School, Nyiro mixed Sec. School, Nyiro boys and girls Sec. School, South Horr Pri. School, Consolata Pri. School and Lmerim nursery school.

Marsabit County

The County has 252 public ECDE centers and 64 private ones. The ECDE enrolments are estimated at 19,239 while the total number of ECDE teachers are 413. The teacher pupil ratio in the pre-primary school is 1:29. The total enrolment in the public and private ECDEs is 16,005. The pre-primary retention rate is 99 percent with a drop-out rate of 0.2 per cent while the transition rate is 99 per cent. There are 231 primary schools of which 181 are public and 50 private. The primary school age population is estimated at 46,178.

The County has 43 secondary schools with the number of students standing at about 6028. Mixed schools make up 44 per cent of these, boy schools 31 per cent and girls schools 25 per cent. The number of secondary schools is inadequate hence the low primary to secondary transition rate.
With respect to post-secondary education, the County has built four youth polytechnics in each sub-county and still plans to build the same in each ward. There are three constituent colleges in the County - Kenyatta University, University of Nairobi and Maasai Mara in Saku Sub-county - which offer diploma courses.

Along the project area, education institutions in section traversed by the project area in Marsabit County include; Gas Pri. School, Russo Pri. School, North Horr Pri. School, North Horr Sec. School, Maikona girls Sec. School and Dr. Godana Memorial Boys Sec. School.

f) Water

According to Samburu County Integrated and Development Plan 2018-2022, Samburu is generally a water scarce County. The main sources of water for domestic and Livestock uses are; Boreholes (137), Water conservation structures (83 water Pans, 29 Dams, Rock Catchments, Roof catchments), Shallow wells, and 21 springs of which 5 have been improved and protected. The County has two permanent rivers. There are 35 protected springs and 104 boreholes.

Households with piped water are 17,133 while 5,500 households have access to potable water. There are 112 water pans and 213 surface dams. The County has 141 shallow wells, 37 unprotected springs and 9800 houses with roof catchment. Water quality in the county is generally poor with most surface water and shallow wells not protected hence contamination may occur.

According to Marsabit County Integrated and Development Plan 2018-2022, the people and livestock in Marsabit County rely on surface or ground water since there are no permanent rivers. There are three water catchments in the County i.e. the upper horizon of mountains and hills, over 1,500m to the summits of Mt Marsabit and Mt Kulal where there are a number of springs. The second catchment is 1,200m to 1,500m, still on Mt. Marsabit are springs like Badassa, Songa and Balesa Bongole. The rest of the county, which generally lies between 400 and 460m, depends mostly on underground

water (i.e. boreholes and shallow wells). In these areas, the ground water table varies greatly. Marsabit County is water insecure because it lacks reliable/permanent surface water sources like rivers and lakes. Hydrological status indicates that ground water is adequate in the lowlands but quality is poor, with many places having concentration of salts above permissible levels for human and livestock consumptions. The water coverage is estimated at about 15 per cent, with the average water produced at 600 cubic metres per day against water demand of about 3,795 cubic metres per day.

Along the project area, majority of people rely on water from boreholes, shallow wells, laggas, oases and rivers for their domestic and livestock use.

The road project is in the Water Scarce locality; data from Sawasco 2018 indicate that Baragoi for instance had Water supply of 200 m3/day against a demand of 1,500 m3/day leaving a deficit of 1,300 m3/day. This calculates to 87% deficit. The mean distance to the nearest permanent water point is estimated at 5 Kilometers.

The main sources of water for domestic and Livestock uses are; Boreholes, Water conservation structures including (water Pans, Dams, Rock Catchments, Roof catchments) Shallow wells, and springs. The main water catchments include Mt Kulal where there are a number of springs. Other springs are also found around South Horr area.
Groundwater is the main source in the project area as per the data from North Horr Sub County given bellow.

The project area is water deficient due to its aridity. The main sources of water are presented in Table 12

Table 5-6: Sources of Water

Sub County	*No. of Water Facilities*					
	Shallow Wells	*Boreholes*	*Pans*	*Rock Catchments*	*Buried Tanks*	*Springs*
North Horr	*220*	*30*	*50*	*10*	*33*	*20*

In these areas, the ground water table varies greatly same to the water quality, many places have concentration of salts above permissible levels for human and livestock consumptions.

g) Sanitation

According to Samburu County Integrated and Development Plan 2018-2022, the County latrine coverage is at 34% which is far below the national target of 100%. Only 116 villages (20 %) have been triggered with seven villages reaching an open defecation free (ODF) status. 477 villages (80%) still need to be reached for triggering. Samburu County does not have a sewerage system in all urban centres. Majority of the households along the proposed road project area do not have latrines hence they practise open defacation. Sanitation in the county is poor due various factors such as lack of awareness on proper hygiene and sanitation leading to low latrine coverage.

In Marsabit County, households in urban areas with latrines account for 34.3 per cent of the population. The sanitation facilities used include pit latrines which account for 25.8 per cent, uncovered pit latrines (13.5 per cent), covered pit latrines (12.3 per cent), VIP (6.5 per cent) and 0.2 per cent flush toilets. Waste/garbage disposal is done by public garbage heap burning which accounts for 19.7 per cent, garbage pit (12.1 per cent), farm garden (8.9 per cent), public garbage

heap (1.9 per cent) and 0.4 per cent disposed by local authority. (Population and Housing Census, 2009).

h) Health Access

According to Samburu County Integrated and Development Plan 2018-2022, the County has one level four hospital situated in Maralal town, one faith based hospital in Wamba and one sub-county hospital in Baragoi town in Samburu North. The county also has 15 level three health facilities, 54 dispensaries (47 owned by GoK, 6 faith based and one owned by NGO,) and 15 private clinics in the county. Doctor patient ratio stands at 1: 10,000 and nurses' patient ratio stands at 91: 100,000 which is below the accepted national standards of 1:1000 for doctors and 55: 100,000 for nurses.

The average household distance to health facility is twenty Kilometres which is way above the national recommended distance of four Kilometres. The prevalent diseases cutting across the population in the County include; confirmed malaria, Urinary Tract Infections (UTI), ear infections, eye infections, burns, skin diseases, diarrhoea, pneumonia, arthritis and joint pains. Health status of the people in the County is influenced by factors such as environmental, social cultural, negative cultural practices and beliefs, low literacy levels and high fertility rates as per the KDHS 2014.

Along the Project area, health facilities traversed by the proposed road Project in Samburu County include; Baragoi sub-county hospital, Baragoi catholic dispensary, South Horr Catholic Health Centre and South Horr dispensary.

According to Marsabit County Integrated and Development Plan 2018-2022, the County has 1 referral hospital and three sub-county hospitals, 2 FBO Hospitals,1 Private hospital, 20 health centres 63 dispensaries, 4 Nursing homes,12 private clinics spread across the four sub-counties of Moyale, Saku, Laisamis and North Horr. In terms of health personnel, the County inherited from the National government 330 health personnel and in the last two years this figure has gone up to 623. This still is one-third of the required total workforce as the number needed to provide service effectively is about 1,800 in relation to the current number of facilities.

There is only 1 specialist doctor in Marsabit, but the County is in the process of recruiting all cadres of medical and surgical specialists. The five top most prevalent diseases in the County include; respiratory tract infections, diarrhea, pneumonia, and skin diseases. Along the Project area, health facilities traversed by the proposed road Project in Marsabit County include; El-Molo Bay dispensary, Gatab Health Centre, Loiyangalani dispensary, Kurungu dispensary, Illeret Health Centre, Gus dispensary, North Horr Health Centre, Maikona dispensary and Malabot dispensary.

i) Energy Access

The main source of energy in the Samburu County is wood fuel (firewood in rural households and charcoal in urban households). An estimated 95% of the total population uses wood fuel. The residents also utilize petroleum products such as kerosene/paraffin, Liquefied Petroleum Gas (LPG) for domestic use, and petrol and diesel fuel for running vehicles and lister engines. Approximately 5,000 Households in the main centers namely; Maralal, Suguta marmar, Kisima, Loosuk, Loibor nkare, Porro, Wamba, Archer's post, Sere-olipi, and Baragoi are connected with electricity, (KPLC, 2016).

Some 10 health centres and 40 schools have also been connected to electricity. 250 number of Schools and 1200 Households use solar lighting. The County's lowlands record about 8-9 hours of sunshine per day with about 4-6 KWh/m² daily insulation. The County also has potential of geothermal energy at an estimate of 680 Megawatts at Emuruaenkokolak near Lake Lokipi to complement hydroelectric power.

The largest wind Project in Africa is in Marsabit County that borders Samburu County, the proximity to the Project that wind speed of about 11 m /s, increases the chances to tap into this resource.

The main source of energy in Marsabit County is wood fuel which is used both for cooking and lighting, while kerosene is predominantly used for lighting. The main type of fuel used by households is both a factor of the socio-economic status of households and availability of alternative low cost energy. The County is not served by electricity from the national grid but by diesel generators and solar energy. Moyale and Sololo are connected with electricity from Ethiopia. Despite massive gains in electricity connectivity in rural Kenya, majority of the households in Marsabit still use firewood as their main source of lighting energy. The total number of households with electricity connection is estimated at 1,273.

j) Housing Types

Samburu County faces serious shortfalls in quality housing provision in both rural and urban areas. The housing sector within the County is mostly private sector driven with most individuals striving to construct their houses or avail houses for rental purposes. Most of permanent housing units are mostly evident in urban areas with distinct types like maisonettes, bungalows, flats and bed seaters. The town centers in the County lack key infrastructure such as a functional sewerage systems and basic social amenities. Other centers are characterized by semi-permanent houses mainly built using cedar post walls and iron roofs.

In Marsabit County, the proportion of households living in mud/wood walled houses is estimated at 34.2 per cent while those living in stone walls are 0.4 per cent, brick/block is at 4.3 per cent, mud/cement 5.7 per cent, wood only 5.7 per cent, corrugated iron sheets 0.5 per cent, grass straw 22.8 per cent, tin 0.5 per cent and others 26 per cent. The classification by floor type indicates that 8.3 per cent of households have cement floored houses, 0.4 per cent tiled floors while 91.3 per cent have earthen floors. Most of the households have grass thatched houses which accounts for 37.5 per cent, and those with corrugated iron sheets roofs are 31 per cent, those with roof tiles are 0.1 per cent, and the concrete 1.1 per cent, Makuti (palm leaves) 1.3 per cent and other materials are at 29 per cent.

k) Vulnerable Groups

In Samburu County, there are 50,000 documented Orphans and Vulnerable Children (OVCs); out of which 10,000 Households with OVCs are beneficiaries of the cash transfer programme. NGOS, CBOS and FBOS such as AMREF, World Vision, Caritas Maralal, SAIDIA, and KIBA are supporting OVCs to access protection services such as birth registration and NHIF registration. The OVCs are also been supported through sponsorship and education programmes. The Charitable Institutions and Child Care Facilities include: Huruma Children's Home in Wamba, Maria Mfariji in Maralal and Springs of Hope Children's Home in Maralal. SHARP is the only center for children with disabilities.

Rescue centers include the Mary Immaculate center in Suguta and Samburu Girls foundation. Maralal prison is the only correctional facility in Samburu County. In the County there exists formal social security provisions under the department of Gender and Cultural Development, Children's Department and Development partners have been implementing safety net Programmes targeting 32000 beneficiaries from the poor and vulnerable sections of the population. The Programmes include; Cash Transfers for Orphans and Vulnerable Children, Older Persons and Persons with Severe Disabilities, response to emergency and disaster situations, food distribution, grants and public works opportunities for the youth. Other Programmes exist in the health, education and agriculture sectors.

In Marsabit County, there are approximately 40,000 Orphans and Vulnerable children in Marsabit. The national government is currently supporting 4000 households under cash transfer programme. There are no rescue centers in the County. However, plans to establish at least 2 children rescue centers. In addition, there are plans to establish child protection units in Saku, North-horr, Loiyangalani, Laisamis, Moyale, Sololo and at Marsabit police division headquarters. Complex children remand home and rehabilitation centers will also be established within this planning period.

People living with disabilities in the County are part of the vulnerable groups and most of them suffer discrimination and poor representation in decision-making processes in the various spheres of socio-economic development. Registration of People Living with Disabilities (PWDs) was done across the County in partnership with National Council of People Living with Disabilities (NCPWD) in 2016 where 2,500 PWDs were registered and were issued PWDs registration cards. For FY 2017-2018, Empowering Programmes for women, Youths and PWDs were allocated 20 million for trainings, 50 % of this fund was used in 2017 and more trainings are on-going in 2018. Wheel Chair race for PWDs was also supported by the department in the year 2015 & 2017 at Isiolo.

The communities living along the proposed road project are vulnerable and marginalized since they are all pastoralists except for the El-Molo who are hunters and gatherers. These communities are vulnerable and marginalized because they are faced with land and resource tenure insecurity, poor service delivery, poor access to health, education and livelihood, poor political representation and exclusion.

l) Security, Law and Order

According to Samburu County Integrated and Development Plan 2018-2022, there are six police stations in the County namely: Maralal, Suguta Marmar, Baragoi, Wamba, South Horr and Archers Post. In addition, there are eleven police posts; Suyan, Loruko, Masikita, Nachola, Lerata, Sereolipi, which have been strategically positioned to maintain law and order in crime prone areas. The types of crime experienced in Samburu county are: Highway banditry, cattle rustling, gender based violence, Intra and Inter ethnic violence. The crime prone areas are; Marti, Mbukoi, Suyan, Morijo, Logetei, Nachola, Ngilai, LogetLusengap, Bendera, NgMugur and Barslinga.

In Marsabit County, there are 7 police divisions, 13 police stations, 6 police posts, 3 GSU camps, 4 patrol bases, 7 AP stations and 44 AP posts. Conflicts in the County result from ethnic rivalry, cultural identity and fight for supremacy, political incitement, access to education, employment, retrogressive cultural practices like cattle rustling, poaching, human killing as a sign of bravery and revenge, conflicts over resources and land boundaries. Areas prone to conflicts and crimes are:

Table 5-7: Sub-County areas prone to conflicts

Sub- county	Areas prone to conflicts
Saku	Songa, Badasa, Kubi Kalo, Jaldesa,Hula Hula, Karatina, Leyai, Kituruni, Marsabit town and Gada- moji
Moyale	Funan Nyata, Hellu, Mansile, Odha, Kinisa, Butiye, Illadu, Godoma, Watiti, Dabel, Kalaliwe and Moyale town
Laisamis	Gudas, Manyatta Lengima, Log Logo, Koya, South Horr, Kargi and Kurkum, Sarima, Arapal, Moite, Gatab, Ngororoi and Lontolio
North-Horr	Galas, Korqa, Sarimo, Darade, Buluk, Illeret, Garwole, Sabare, Bales Arbale, Bales Saru, Dukana, Arap trees, Kubi Adi, El Hadi, Marime, Sibiloi Karsa, Chari Ashe, Forole, Elle Dimtu, Idhidho, Torbi, Demo Sotowesa, Yamicha, Lalesa, Shurr, Bales bura, Olom, Kuro and Medate

5.4 Ecological characteristics of the project area

5.4.1 Ecological zones and climate

The project area can be subdivided into 4 main categories as described below.

a) Sub-Humid/Forest Zones - Ecological Zone II

Sub-humid zone which includes parts of Mt. Kulal (1,700m a.s.l) supports dense evergreen forests and is characterized by high rainfall of up to 1,000mm per annum, low evapo-transpiration. This zone mainly supports agro-pastoral livelihood systems and have soils that are suitable for rain-fed agriculture. Although, it covers just about one per cent of the county, this is an important water catchment area.

b) Semi-Arid areas/Woodland Zone - Ecological zone IV

The semi-arid areas have a medium potential for supporting both pastoralism and agriculture. These comprise areas that constitute the middle slopes of Mt. Kulal and the Baragoi-South Horr escarpments.

c) Arid areas/ Bush land Zone - Ecological Zone V

The arid areas include the lower slopes of volcanic and basement piles lying between 700m and 1,000m above sea level. The soils are shallow and stony clay loams with rock outcrops while the flatter areas are covered by grass. The zone consists of the plains. These areas are characterized by steeper slopes which may favour greater surface run-off and hence exposed to greater sheet erosion. The zone is mainly used as grazing fields for wildlife and livestock and is mostly evident in the Lake Turkana Basin

d) Very Arid/ Dwarf Scrubland Zone - Ecological Zone VI

This zone comprises the most extensive in the area and includes all the hills and plains below 700m above sea level. The typical vegetation is dwarf-shrub grassland or a very dry form of bushy grassland. These areas have extremely short grazing season, mostly lasting not more than two

months after the rain seasons. In extreme period of rainfall failure, the only vegetation available in this area is dwarf-shrub, which mainly supports goats and camels.

5.5 Climate

The project area is in an arid type of climatic condition with the exception of the areas around Mt. Kulal, and South Horr escarpment (Mt Nyiro), which represent typical semi-arid condition. The temperature ranges from a low of 150C to a high of 260C, with an annual average of 20.50C (World Weather and Climate Information, 2015). It has a bi-modal rainfall pattern. The long rain season fall between April and May while the short rain season falls between November and December. Rainfall ranges between 200mm and 1,000mm per annum and its duration, amount and reliability increases with rise in altitude. North Horr (550m) has a mean annual rainfall of 150mm; Mt. Kulal experience 800mm.

5.5.1 Environment and Climate change

Environmental degradation in the project area is mainly as a result of deforestation and forest encroachment due to dependence on firewood and overgrazing. Other drivers of environmental degradation include non-compliance with the law, weak enforcement of the environmental regulations, inadequate disposal of non-biodegradable materials like plastics and polythene, low levels of environmental awareness and low social responsibility on environmental matters at individual and community levels. Mt. Kulal Forest biosphere conservancy for instance is under pressure from growing human settlements on the mountain, the rare cedar species is being depleted for building houses and selling to the surrounding towns of Loiyangalani and South Horr. The multiple effect of deforestation leads to accelerated soil erosion, resulting in bare rocky surfaces of the slopes around Mt. Kulal. Effects of climate change include:

- Climate change has tremendous influence on the county's bimodal rainfall pattern. It's difficult to predict the onset of the short or the long rains. This has affected farming activities in regard to land preparation and increased crop failures, hence impacting negatively on agriculture dependent livelihood;
- Water resources have also been affected as many springs that previously flowed from the forest are drying up. Prolonged and recurrent drought has led to reduced forage, degradation of the environment and an increase in destitution;
- Frequent droughts that have led to erosion of livelihood opportunities through livestock deaths and crop failure which together negatively affect food security;
- The loss of habitats and the consequent reduction in wildlife population hinders tourism growth in the region;
- Water resources are also affected- water levels in ecological lakes, dams and pans have generally declined, while extreme rainfall events have resulted to sedimentation of water reservoirs.

5.5.2 Topography

The project falls on the northern interface between highlands and lowlands. North of Baragoi - Tuum and South–Horr axis, the area rises to Mount Nyiro tapers northwards and falls steeply southwards. South and west of Mount Nyiro are peneplains which have been eroded to plains of lower levels ranging from 1000 -1,350 m above sea level the rest of the project area is a continuous basin, which slopes northwards to Lake Turkana and east of Mathew Ranges. The high altitude of the plateau and

the mountain ranges has resulted in indigenous forests, which are all gazetted and preserved for rain catchments.

Most of the area is an extensive plain lying between 300m and 900m above sea level, which gently slopes towards lake Turkana. The plain is bordered by hills and mountain ranges and is broken by volcanic cones and calderas. The Chalbi Desert, lie between 435m and 500m elevation and is characterized by physical feature that forms a large depression. The depression seats within the Great Rift Valley and is only separated from Lake Turkana by a ridge that rises to 700m, far above 65m to 100m elevations in Turkana.

5.5.3 Soils and geology

Five major rock systems occur in the study area although at the local level each system can be further subdivided into smaller units depending on the local environment. These include:

1. Superficial deposits;
2. Sedimentary rocks;
3. Volcanic rocks;
4. Intrusive rocks;
5. Metamorphic rocks of the Basement System.

a) Superficial Deposits

Superficial deposits are weathering products of the existing rocks. In the project area, they are found as alluvial sands and silt in stream channels, lake basins and at the bases of inselbergs where they form alluvial fans. They also form as colluvium in the piedmont plains and peneplains. Colluvium consists of a matrix of silt, sand, gravel and pebbles, with grain size tending to be away from the inselberg. In the Chalbi playa, superficial rocks appear as lacustrine, colluvial, aeolian and fluvial deposits.

b) Sedimentary rocks

Sedimentary rocks are represented by grits, which appear as coarse clastic deposits derived from metamorphic rocks. The name, “Turkana Grits” generally refers to any consolidated sediments, occurring between the Basement and the Tertiary lavas within the Turkana Basin. The grits of the Chalbi Basin are known as the Maikona Formation. This gritstone is brownish-red weathering into medium to coarse–grained type of soil. It is well-bedded, showing planar cross bedding.

c) Volcanic Rocks

The most common are shield basalts of Tertiary-Quaternary age. They occur as laterally extensive domes, but also forming extensive lava plains like the Dida Galgalo plain. The older basalts are finer grained than the younger ones which show a more rugged texture, volcanic rocks constitute the Quaternary volcanics. Their vents are in the volcanic centers of Marsabit, Kulal, Asie and Hurri. They are, however, most extensive on the Hurri dome where they occur as composite volcanics, pyroclastics associated with volcanic cones, volcanics of older degraded centres and most widely as basaltic lavas with well-defined flow margins. Northwest of Mt. Kulal they also contain basanites, tephrite and ignimbrites.

Their occurrence on Marsabit and Hurri is confined to narrow basalt lava flows, lapili breccias of basaltic cinder cones and bedded basaltic pyroclastics. Tertiary volcanic rocks also occur extensively as plateau flood basalts locally called Martis. These occur in outlier patches or fields of low altitude plateaus generally no more than 5-10 metres above the surroundings. Their tabular surface usually comprises of angular boulders with no soil component and no runoff channels such that when it rains, the rainwater either infiltrates into the rocks or is lost to evaporation. The olivine basalt flow rest on the end-Tertiary peneplain along the western side of the area and are therefore post-middle Pliocene in age. Two flows of olivine basalt are recognized in the area, one bearing a thin soil and vegetation cover and the other is more of bare surfaces that characterize the overlying rocks. The volcanics in the area overlie the Basement System rocks.

d) Metamorphic Rocks

Various varieties of gneisses occur in the metamorphic Basement areas, including banded biotite gneisses, (sometimes semipelitic), banded hornblende-biotite gneisses, quartzofeldspathic gneisses, hornblende gneisses, graphitic gneisses, garnet-sillimanite gneisses, calc-silicate gneisses, muscovite gneisses, quartz and metaquartzites, hornblende biotite migmatites and migmatites. Around Baragoi, they occur as gneisses, muscovite gneisses, quartzites and biotite migmatites.

e) Intrusive Rocks

Intrusive rocks are rock materials which have been intruded under pressure into already existing rock system and have a lithological composition different from the host rock. They may also differ lithologically from intrusion to intrusion. Intrusive rocks appear in different forms and shapes, the commonest being:

- Sills (which are usually intruded along the stratification plane of the host rock and therefore are commonest in sedimentary rocks);
- Domes (usually circular or irregular in shape);
- Dykes (usually linear narrow strips of rock material intruded along a fault in the parent rock.

The last two are the intrusion types most commonly encountered in the project area. Intrusive rocks especially pegmatitic dykes are very common in metamorphic rocks but usually as small structures difficult to show on a map. Larger intrusions have been encountered around Baragoi area where they appear as domes,

5.5.4 Laggas

There are several laggas along the project road and some of them are used as sand sources during the dry periods. Most of these laggas dry up during the dry season These laggas form flat broad valleys.

5.5.5 Habitats and vegetation

The main habitats in the project area include the mountainous environments which also include the hills and escarpments which are mainly forested, the desert environments and finally the aquatic environment.

Forests and Bush lands

Forests in the project area comprises of both gazetted and Un-gazetted types. The gazetted forests include the Mt. Nyiro forest reserve with an estimated area of (45, 931 Ha) included under Mt. Nyiro forest is South Horr forest station which also manages Ndotos Range forest reserve. Other forests include Mt. Kulal which are non-gazetted. The main tree species consist of wild olive (Olea Africana), Elgon teak (Olea capensi), Podo (Podocarpus falcatus), Cedar (Juniperus procera), Croton megalocarpus, Teclea nobilis and African mountain bamboo. The low-lying areas of Samburu North and East are covered by dryland forest species that include mainly Acacia and Commiphora Species.

These forests are an important habitat for several wildlife species like elephants, buffaloes, bushbucks, baboons, monkeys, lions, hyenas, leopards and wild dog as well as several bird species. The forests also serve as important wildlife corridors and dispersal areas for wildlife habitats in the Community Wildlife Conservancies,

The Chalbi Desert Environment

Chalbi Desert is estimated to cover an area of 948 sq. km. and lies between 435m and 500m elevation. The name originates from the native language of the Gabra people as “salty and bare” the desert is believed to have once been part of an extensive lake, as evidenced by the basin that fills with shallow water during heavy rains and fossilized remains of snail shells and fish vertebrae. The desert landscape consists of rocky lava flows, cracked earth and a sandy mixture of white salt and clay. On the northern edge is a gorgeous area of oases with groves of palm trees that attract sand grouse and other birds including guinea fowls and other wild animals which includes ostriches, grey’s zebras, Oryx and other adapted animals. The oases are used by the Gabra people as water sources for their camels.

5.5.6 Aquatic Environment

Lake Turkana, formerly known as Lake Rudolf, is a lake in the Kenyan Rift Valley, in northern Kenya, with its far northern end crossing into Ethiopia. It is the world's largest permanent desert lake and the world's largest alkaline lake. Three rivers (the Omo, Turkwel and Kerio) flow into the lake, but lacking outflow, its only water loss is by evaporation. The lake water is potable but unpalatable. It supports a rich lacustrine wildlife.

As a habitat, the lake contains the following categories of fauna:

Plankton:- Both phytoplankton and zooplankton are found in the lake.
Fish:- The lake holds about 50 fish species, including 12 endemics: the, the barb the catfish and many more species. Non-endemics include species such as Nile tilapia; the elephant fish the Nile perch and numerous others.
Birds:- The Lake Turkana region is home to hundreds of species of birds native to Kenya. The East African Rift System also serves as a flyway for migrating birds, bringing in hundreds more. The birds are essentially supported by plankton masses in the lake, which also feed the fish. Some birds more common to Turkana are the little stint, the wood sandpiper, and the common sandpiper. The African skimmer nests in the banks of Central Island. The white-breasted cormorant ranges over the lake, as do many other water birds. The greater flamingo wades in its shallows. Heuglin's bustard is found in the east of the lake region.
Reptiles:- In this category are the Nile crocodiles, the large water turtles, particularly in the area of Central Island. The Turkana mud turtle is endemic to the lake.
Mammals:- Over the dry grasslands ranges a frail population of grazing mammals and predators. The grazers are chiefly Grey’s zebra, Burchell's zebra, the beisa oryx, Grant's gazelle, the topi and the reticulated giraffe.

5.5.7 Wildlife resources

Some of the common animal species and there Habitat as previously reported include:

Table 5-8: Main Wildlife Species and Their Status

Wildlife Species	Habitat Most Found	Status Report
Elephant	Forests and Bushlands	Population drastically reduced by poaching & drought
Rhinoceros	Mt. Kulal forests	Extinct in the county
Lion	Forests, woodland, bush/ shrublands	Near extinction
Leopard	Forest and ASALs	Near extinction
Cheetah	Nasals	Near extinction
Oryx	ASAL areas	Threatened
Thomson's gazelle	Plains and all ASALs	Threatened
Ostrich	Plains	Threatened
Spotted hyena	Plains and all ASALs	Population increasing
Gerenuk	Bushlands/shrublands	Normal
Giraffe	Plains and bushlands	Near extinct
Crocodile	Lake Turkana	Normal
Gravy's zebra	Plains and bushlands	Threatened
Baboons	Forests and woodland	Thriving

5.6 Noise and Vibration

Other than sections crossing towns, the rest of the road crosses areas that are serene with low ambient noise levels. The latter is because they are rural settings with sparse settlement. Currently the project road has minimal traffic and the number reduces further between Loiyangalani and Gus. Receptors for noise and vibration have been listed below:

6. POLICY LEGAL AND INSTITUTIONAL FRAMEWORK

This Chapter of the report presents a discussion of the policy, Legal and institutional framework in Kenya which is of relevance to the road project.

6.1 Policy framework

6.1.1 The Constitution of Kenya of 2010

The Constitution of Kenya has taken on board various issues that are related to environmental management. Article 42 of the Bill of Rights contained in the Constitution provides that 'every Kenyan has the right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislative and other measures'. Chapter 5 of the Constitution is dedicated to land and the environment. The Constitution requires that land be used and managed in a manner that is equitable, efficient, productive and sustainable. Part 2 of Chapter 5 of the constitution is dedicated to Environment and Natural Resources. Article 69 in Part 2 provides that the state shall provide for and encourage efforts towards sustainable use of natural resources, increasing of the national forest cover public participation in the management, protection and conservation of the environment, protection of genetic resources and biodiversity, environmental impact assessment, environmental audit and monitoring of the environment, etc. The proposed project should ensure compliance with the constitutional requirements in as far as equitable sharing of the resources between various stakeholders is concerned on matters of sustainability of livelihoods and biological resources public participation Resettlement Action Plan among others.
The Kenyan constitution also gives prominence to public participation; as a general national value in environmental protection. Article 69(1) states that the State shall encourage public participation in the management, protection, and conservation of the environment.

6.1.2 National Environmental policy

The Republic of Kenya has several sector specific policies which provide guidance on environmental and social management and conservation. These policies cover issues of Public health, Environmental conservation, forest management and conservation, wet lands management, Climate change, sustainable water use, wildlife conservation, biodiversity conservation, physical planning, occupational health and safety among others. The table below provides details on the policies in the country that are relevant to the road project.

Table 6-1: The relevant policies in the country

Policy	The Main relevant details
Sessional Paper No. 10 of 2012 on Kenya Vision 2030	Vision 2030 aims at creating a globally competitive and prosperous country with high quality of life by 2030. The vision is anchored on three pillars; Economic; Social and Political pillar. The social Pillar seeks to create a just, cohesive and equitable social development in a clean and secure environment. The proposed road project will open up opportunities for the local residents creating jobs and improving access to markets.
Environment and Development (Sessional Paper No. 6 of 1999)	The policy defined approaches that will be pursued by the Government in mainstreaming environment into development. This policy is relevant to the road development project in view of the

	potential impacts on the environment and involvement of the public in project planning and operation.
Sessional Paper No. 10 of 2014 on the National Environment Policy	The policy seeks to provide the framework for an integrated approach to planning and sustainable management of natural resources in the country. It recognizes the various vulnerable ecosystems and proposes various policy measures to mainstream sound environmental management practices in all sectors of society throughout the country and recommends strong institutional and governance measures to support achievement of desired objectives and goals. The proposed project road will pass near Lake Turkana which is a vulnerable ecosystem.
National Environmental Action Plan (NEAP) of 2009-2013	The NEAP addresses environmental issues through various lead agencies in a bid to achieve Vision 2030 and attain the sustainable development goals.
The National Poverty Eradication Plan (NPEP) of 1999	A plan to reduce poverty and strengthen the capabilities of the poor and vulnerable groups to earn income. Also meant to reduce gender and geographical disparities for healthy, better educated and more productive population. The proposed project will have impact on agriculture, health education among others which will improve the lives of people living in the area.
The National Biodiversity Strategy of 2000	The objective of the strategy is to conserve Kenya's Biodiversity in line with the international Convention on Biological diversity (CBD); among other things it advocates for the sustainable use of biodiversity resources for the benefit of all stakeholders. Key biodiversity resources identified along the project road will be preserved and due care will be taken to limit cutting of indigenous trees and shrubs.
Sessional Paper No. 3 of 2009 on National Land Policy	The National Land Policy has the objective to secure rights over land and provide for sustainable growth, investment and reduction of poverty in line with the Government's overall development objectives. The policy provides a framework of policies and laws designed to ensure the maintenance of a system of land administration and management that provides; (a) All citizens with the opportunity to access and beneficially occupy and use land; (b) Economically viable, socially equitable and environmentally sustainable allocation and use of land; (c) Efficient, effective and economical operation of land markets; (d) Efficient and effective utilisation of land and land based resources; and (e) Efficient and transparent land dispute resolution mechanisms. This policy will apply when land acquisition will be necessary during the project operation phase and appropriate compensation made depending on the land ownership rights.
Sessional Paper No. 8 of 2012 on National Policy for the Sustainable Development of Northern Kenya and other Arid Lands	4.2 The objectives of this policy are: i. To strengthen the integration of Northern Kenya and other arid lands with the rest of the country and mobilise the resources necessary to ensure equity and release the region's potential.

	ii. To improve the enabling environment for development in Northern Kenya and other arid lands by establishing the necessary foundations for development. iii. To develop alternative approaches to service delivery, governance and public administration which accommodate the specific realities of Northern Kenya and pastoral areas. iv. To strengthen the climate resilience of communities in the ASALs and ensure sustainable livelihoods. The proposed road project has the potential to open the Arid areas in which it traverses to development keeping pace with other parts of the country.
Forestry Policy of 2014	The overall goal of this Policy is sustainable development, management, utilization and conservation of forest resources and equitable sharing of accrued benefits for the present and future generations of the people of Kenya. The proposed project ESIA will incorporate in the environmental and social Management plan the measures to conserve forests and revegetation where cutting of trees is inevitable.
Wildlife Policy of 2011	The goal of this Policy is to provide a framework for conserving, in perpetuity, Kenya's rich diversity of species, habitats and ecosystems for the wellbeing of its people and the global community.
Wetlands Policy of 2013	The goal of the policy is to ensure wise use and sustainable management of wetlands in order to enhance sustenance of their ecological and socio-economic functions for the present and future generations of Kenya. The policy is guided with the principles of *Wise use*, *Precautionary principle*, *Polluter pays*, *Equity*, *Ecosystem Based Management Approach*, *Devolution*, *public participation* among others. The Lake Turkana is a key feature on which the road will pass near so this policy will be relevant to the project.
Physical Planning Policy	The policy governs the development and approval all building plans as provided for in the Physical Planning Act (Cap 286). The proposed project will be subjected to the provisions of this policy and legislation.
Public Health Policy of 2014	The public health policy calls upon the project proponents to ensure that buildings are adequately provided with utilities so that they are fit for human habitation. The workers camps must be provided with all amenities/utilities that are essential for safeguarding public health for all people using the facilities.
Occupational Health and Safety Policy of 2012	The Policy promotes basic principles of assessing occupational risks and/or hazards; combating hazards at source; and developing a national preventative safety and health culture that includes information, consultation, research and training. The Policy applies to all workplaces in all sectors of the economy and all forms of work guided by the existing laws on Occupational Safety and Health (OSH), Work Injury Benefits and other relevant

	regional and International Labour Standards without any exemption. The main focus is prevention and control of work-related accidents and diseases, compensation and rehabilitation of workers injured in the course of work and those who contract occupational diseases. The contract for the road construction will have to consider Health and safety provisions from the onset of the construction work.
Kenya AIDS Strategic Framework 2014/2015-2018-2019	The Kenya AIDS Strategic Framework (KASF) 2014/15-2018/19, is the Strategic guide for the country's response to HIV at both national and county levels. The framework addresses the drivers of the HIV epidemic and builds on achievements of the previous country strategic plans to achieve its goal of contributing to the country's Vision 2030 through universal access to comprehensive HIV prevention, treatment and care. The goal of this plan is to contribute to achieving Vision 2030 through universal access to Comprehensive HIV prevention, treatment and care.
Kenya National Policy on Gender and Development (NPGD), 2000	The policy addresses the approach of gender mainstreaming and empowerment of women at the all levels. The policy aims at a society where women, men, children and persons with disabilities enjoy equal rights, opportunities and a high quality of life. Gender concerns will be addressed in the planning and implementation phase of the road project, men and women will have to be given equal opportunities when they emerge.
The Kenya National Climate Change Response Strategy of 2010	The vision of the Climate Change Response Strategy is for a prosperous and climate change resilient Kenya. One of the strategic objectives is to Conduct periodic vulnerability assessments, impacts monitoring at national and local levels, GHGs monitoring, and provide capacity building framework
KeNHA's Environment and Social Safeguards Policy, 2018	The revised policy is set within KeNHA Vision of quality, safe and adequate National Trunk Roads network. It contains the actions KeNHA will take so as to ensure that the Authority activities don't negatively harm the environment and adversely affect the social fabric in communities where it works. Working in an environmentally and socially responsible and safe manner are conditions of employment of contractors for various projects. This policy is therefore targeting all its staff, contractors and other service providers.

6.1.3 Environmental Sustainability Guidelines 2017

The National Environmental Management Authority has established Environmental Sustainability guidelines for ministries, Departments and agencies which has reduced the number of cross cutting performance indicators that are now effectively implemented through existing administrative and legal frameworks. The purpose of the sustainability guidelines is to ensure that MDAs in undertaking their mandates, integrate environmental considerations in their operations to fulfil the requirement of a clean, healthy and sustainable environment for all as per article 42 of the Constitution and EMCA Cap 387. This requires the adoption and maintenance of good practices that contribute to the quality of environment on a long term basis.

The guidelines provide six areas which an institutional sustainability audit should focus on as;

a) Environmental sustainability planning- requiring development of an institutional environmental policy, establishing structures to address environmental issues
b) Waste management and pollution control requiring compliance with Waste and water quality regulations
c) Climate Change Mitigation and adaptation
d) Environmental ecological enhancement
e) Environmental education and awareness
f) Promoting environmental protection and conservation through partnerships with stakeholders

The road project will involve partnerships and engagement of stakeholders requiring that its implementation follows these guidelines provided by NEMA to ensure that the environment is protected and the community through which the road traverses appreciates the project.

6.2 National legal framework

The Republic of Kenya has numerous statutes that guide environmental management and conservation in the country. Most of these statutes are sector specific and cover a wide range of issues including public health, soil conservation, protected areas conservation, endangered species, public participation, water rights, water quality, air quality, excessive noise control, vibration control, land use, among others.

6.2.1 Environmental Management and Coordination Act (EMCA, Cap 387)

The Section Part VI of EMCA, Cap 387 Part II states that every person is entitled to a clean and healthy environment and has the duty to safeguard the same. To achieve this goal, the projects listed under the Schedule No. 2 of EMCA must be subjected to Environmental Impact Assessment (EIA). The aim of EIA is to reduce negative environmental outcomes of the listed projects by implementing mitigation measures. The proposed project falls within the Second schedule and must therefore comply with EMCA requirements in as far as EIA is required. There are also several regulations that have been formulated within the framework of EMCA, Cap 387 that are applicable to the proposed project.

Under EMCA, Cap 387 NEMA has gazetted legal tools that govern conduct of EIAs and general environmental protection. The Proposed Road project has been screened against these tools with results outlined in the table below. Detailed analysis of the trigger mechanism and modalities for mitigation are provided in Chapter 9 and 11 of this report.

Table 6-2: Analysis of Key EMCA, 2015 Relevant Regulations

Legal Tool	Status	Trigger mechanism/ Relevance to the project
Environmental Management and Co-ordination (Environmental Impact Assessment and Audit) Regulations, 2003	Triggered	ESIA Study must conform to these rules. The proposed project must comply with the requirements of the regulations that also include conducting continuous monitoring and annual audits on the proposed project
Environmental Management and Co-ordination (Waste	Triggered	Construction of the project will generate solid waste hence proper disposal of wastes will need to be observed by the

Legal Tool	Status	Trigger mechanism/ Relevance to the project
Management Regulations, 2006)		contractor in key areas such as workers camps and the road works.
Environmental Management and Co-ordination (Water Quality) Regulations, 2006	Triggered	Water for construction will be drawn from Rivers and boreholes and there will also be work over rivers when constructing bridges and box culverts
Environmental Management and Co-ordination (Fossil Fuel Emission Control) Regulations, 2006	Triggered	There will be use of vehicles, machinery and equipment that depend on fossil fuel as their source of energy hence contractor must comply with emission levels as highlighted by the regulations.
Environmental Management and Co-ordination (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations, 2006	Triggered	The proposed road traverses' areas with diverse ecosystems which will need to be protected as per the requirements of this regulation.
Environmental Management and Coordination (Air Quality) Regulations 2014	Triggered	Construction activities, construction crew and facilities such as asphalt and concrete batching plants and quarries are likely to cause air pollution. The Proponent shall implement the mitigation measures proposed to comply with the provisions of these Regulations.
Environmental Management and Co-ordination (Controlled Substances) Regulations, 2007	Triggered	The project contractors will need to ensure that the requirements of this regulation are observed to ensure that equipment, machinery, vehicles and chemicals containing controlled substances are not imported into the country for use in the proposed project
Environmental Management and Co-ordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, 2009	Triggered	The road crosses the wetlands, laggas, along Lake Turkana and river banks which are valuable water resources along the route. The contractor will need to employ measures for the preservation and conservation of these wetlands, laggas and river systems.
Environmental Management and Co-ordination (Noise and Excessive Vibration Pollution Control) Regulations, 2009	Triggered	The project will involve use of heavy earthmoving equipment and trucks which can generate excessive noise and vibrations. The contactor of the road will have to ensure that no excessive noise and vibrations are made during the construction of the road.

6.2.2 The Wildlife Management and Conservation Act 2013

This act applies to all wildlife resources on public, community and private land and Kenyan territorial waters. Part I 4. Of the act Provides the general principles guiding the implementation of the act as; (a) Wildlife conservation and management shall be devolved, wherever possible and appropriate to those owners and managers of land where wildlife occurs; (b) Conservation and management of wildlife shall entail effective public participation; (c) Wherever possible, the conservation and management of wildlife shall be encouraged using an ecosystem approach; (d) Wildlife conservation and management shall be encouraged and recognized as a form of land use on public, community

and private land; (e) Benefits of wildlife conservation shall be derived by the land user in order to offset costs and to ensure the value and management of wildlife do not decline; (f) Wildlife conservation and management shall be exercised in accordance with the principles of sustainable utilization to meet the benefits of present and future generations; (g) Benefits accruing from wildlife conservation and management shall be enjoyed and equitably shared by the people of Kenya.
The proposed project will have to ensure the conservation of wildlife resources within the counties in which it traverses.

6.2.3 Forest Conservation and Management Act, 2016

The relevant principles of this act to the proposed road project are; Public participation and community involvement in the management of forests, consultation and cooperation between the national and county governments, the protection of indigenous knowledge and intellectual property rights of forest resources and international best practices in the management and conservation of forests.
The proposed project will have to ensure proper management of the forest resources within its jurisdiction in consultation with the local community and the county governments.

6.2.4 The Water Act 2016

The purpose of the 2016 Water Act is to align the water sector with the Constitution's primary objective of devolution. The act recognizes that water related functions are a shared responsibility between the national government and the county government. It also gives priority to use of abstracted water for domestic purposes over irrigation and other uses.
The act sets in place the Water Resources Authority (WRA) whose objective of is to protect, conserve, control and regulate use of water resources through the establishment of a national water resource strategy.

The proposed road project implementation will involve applying for water use permits and authorization both at the County level and the national level of governance.

6.2.5 The Agriculture, Fisheries and Food Authority Act of 2013

Agriculture, Fisheries and Food Authority Act, 2013 (No. 13 of 2013) provides for the establishment of the Agriculture, Fisheries and Food Authority, the administration of matters of agriculture and the preservation, utilization and development of agricultural land and related matters.

The Act requires the Authority in consultation with the county governments to among others promote best practices. The Cabinet Secretary is required under the Act with the advice of the Authority, and in consultation with the National Land Commission, to provide general guidelines applicable in respect of any category of agricultural land. These land development guidelines are to be implemented by the county governments. In a like manner, the Cabinet Secretary is given powers to make general rules for the preservation, utilization and development of agricultural land and aquatic resources and prescribe national guidelines for soil conservation. Each county government is required to keep a register of land development orders and land preservation orders, which they may issue under this Act. The Act also provides for participation by farmers.

This act is relevant to the project road because it traverses through livestock keeping/ pastoral areas.

6.2.6 Energy Act, 2006

This is an Act of Parliament to amend and consolidate the law relating to energy, to provide for the establishment, powers and functions of the Energy Regulatory Commission and the Rural Electrification Authority, and for connected purposes. The provisions of this Act apply to every person or body of persons importing, exporting, generating, transmitting, distributing, supplying or using electrical energy; importing, exporting, transporting, refining, storing and selling petroleum or petroleum products; producing, transporting, distributing and supplying of any other form of energy, and to all works or apparatus for any of these purposes.
The Act establishes a Commission known as the Energy Regulatory Commission, that among other roles, is expected to regulate (i) importation, exportation, generation, transmission, distribution, supply and use of electrical energy, (ii) importation, exportation, transportation, refining, storage and sale of petroleum and petroleum products; (iii) production, distribution, supply and use of renewable and other forms of energy.

This Act is relevant to the proposed road project due to the need to relocate some of the petrol stations situated along the route.

6.2.7 Land Act, 2012

The Land Act was enacted by Parliament to give effect to Article 68 of the Constitution, to revise, consolidate and rationalize land laws; to provide for the sustainable administration and management of land and land-based resources, and for connected purposes. The Act applies to all land declared as (a) public land under Article 62 of the Constitution; (b) private land under Article 64 of the Constitution; and (c) community land under Article 63 of the Constitution and any other written law relating to community land.

The Land Act guarantees security of tenure for land under (a) freehold; (b) leasehold; (c) such forms of partial interest as may be defined under the Act and other law, including but not limited to easements; and (d) customary land rights, where consistent with the Constitution and guarantees equal recognition and enforcement of land rights arising under all tenure systems and non-discrimination in ownership of, and access to land under all tenure systems.

Under the Lands Act 2012, The Wayleaves Act, Cap 292 and The Land Acquisition Act, Cap. 295 have been revoked but Sections 8 and 9 allow for Compulsory Acquisition as an option in acquiring land for public utility.

6.2.8 The Land Registration Act, 2012

This is an Act of Parliament that revises, consolidates and rationalizes the registration of titles to land, to give effect to the principles and objects of devolved government in land registration, and for connected purposes. The Act requires that there is proper marking and maintenance of boundaries. An interested person who has made an application to the Registrar for his/her boundaries to be ascertained, the Registrar shall give notice to the owners and occupiers of the land adjoining the boundaries in question of the intention to ascertain and fix the boundaries. With regard to the maintenance of boundaries, the Act requires every proprietor of land to maintain in good order the fences, hedges, stones, pillars, beacons, walls and other features that demarcate the boundaries, pursuant to the requirements of any written law

6.2.9 The National Land Commission Act, 2012 (No. 5 of 2012)

An act of Parliament to make further provision as to the functions and powers of the National Land Commission, qualifications and procedures for appointments to the Commission; to give effect to the objects and principles of devolved government in land management and administration, and for connected purposes. The commission among other functions is mandated; (a) to manage public land on behalf of the national and county governments; (b) to recommend a national land policy to the national government; (c) to advise the national government on a comprehensive programme for the registration of title in land throughout Kenya; (d) to conduct research related to land and the use of natural resources, and make recommendations to appropriate authorities; (e) to initiate investigations, on its own initiative. or on a complaint, into present or historical land injustices, and recommend appropriate redress; (f) to encourage the application of traditional dispute resolution mechanisms in land conflicts; (g) to assess tax on land and premiums on immovable property in any area designated by law; and (h) to monitor and have oversight responsibilities over land use planning throughout the country.

The provision of this act are applicable to the proposed road project in the view of land acquisitions that will be necessary during the project implementation.

6.2.10 Community Land Act 2016

The Community Land Act, No. 27 of 2016 (the Act) came into force on 21 September 2016. The Act aims at:

1. Giving effect to Article 63 of the Constitution of Kenya, 2010 (the Constitution) which provides for a classification of land known as community land. To this end, the Constitution provides that community land shall vest in and be held by communities.
2. Providing for;
   - The recognition, protection and registration of community land rights.
   - The management and administration of community land.
   - The role of county governments in relation to unregistered community land and related matters.

The Act repeals the Land (Group Representatives) Act (Chapter 287 of the Laws of Kenya) and the Trust Lands Act (Chapter 288 of the Laws of Kenya). This project shall uphold the requirement of all the relevant land legislations, involving key administrative stakeholders and the affected parties (i.e. the community) facilitating in coexistence with the surrounding community. Most of the land within the project route is community land. Community consultations and consent will be critical during project construction period.

6.2.11 The Environment and Land Court Act, 2011

An Act of Parliament to give effect to Article 162(2)(b) of the Constitution; to establish a superior court to hear and determine disputes relating to the environment and the use and occupation of, and title to, land, and to make provision for its jurisdiction functions and powers, and for connected purposes.

Any disputes relating to environment will be resolved by the environment court during the implementation of the proposed road project.

6.2.12 The County Governments Act 2012

This is an Act of parliament to give effect to Chapter Eleven of the Kenyan Constitution; to provide for County government's powers, functions and responsibilities to deliver services and for connected purposes. Section 113 of the Act makes public participation in County planning processes compulsory.

The proposed project will be implemented within Marsabit and Samburu counties.

6.2.13 Occupational Safety and Health Act 2007

An act of Parliament to provide for the safety, health and welfare of workers and all persons lawfully present at workplaces, to provide for the establishment of the National Council for Occupational Safety and Health and for connected purposes. This act provides for the registration of workplaces/renewal, reporting of occupational accidents and or diseases, formation of health and safety committees in the workplace, training of workers among others.

The proposed project will be subject to the provisions of this act and the contractor will have to comply with all the provisions therein in order to safeguard the health and safety of all those at work.

6.2.14 The Public Health Act (Chapter 242) of Revised Edition 2012

The Public Health Act (Chapter 242) is an Act of Parliament that provides for securing and maintaining good health of citizens. The Act contains directives that are focused on ensuring protection of human health. There are provisions within the Act that deal with water, air and noise quality as they pertain to human health. An environmental nuisance includes the emission from premises of waste waters, gases and smoke which could be regarded as injurious to health. The owner and/or occupier of premises responsible for such nuisances are liable to prosecution under the Act. The construction of the proposed road has potential pollution risks related to water and air.

The project road construction will require that the dust emanating from the construction activities be managed by watering the loose surfaces. Pollution or destruction of community water sources should be avoided and all efforts put in place to ensure a healthy environment for the residents.

6.2.15 The Valuers Act (Cap 532), 1985

The revised edition 1985 of the Valuers Act Cap 532 makes provisions for the relevant charges and conducts of valuers in relation to valuation of assets. The Act also provides the relevant regulations and guidelines in the undertaking of the valuation works. The Act requires that adequate valuation is carried out to help meet the actual compensation measures and the market rates and reduce any acts of malice in the exercise. A competent valuer will have to be deployed to site to carry out the professional valuation of assets for compensation.

6.2.16 Physical Planning Act (Cap. 286)

This Physical Planning Act, Cap. 286 provides for the preparation and implementation of physical development plans. Section 36 of the Act provides for environmental impact assessments and states that 'if in connection with a development application a local authority is of the opinion that proposals for industrial location, dumping sites, sewerage treatment, quarries or any other development activity will have injurious impact on the environment, the applicant shall be required to submit together with

the application an environmental impact assessment report'. The proponent and contractors of the proposed road will need to comply with the requirements of this Act

6.2.17 The Penal Code (Cap. 63

The Penal Code (Cap. 63) chapter on "Offences against Health and Conveniences" strictly prohibits the release of foul air into the environment, which affects the health of other persons. Any person who voluntarily violates the atmosphere at any place, to make it noxious to health of persons in general dwelling or carrying out business in the neighbourhood or passing along public ways is guilty of misdemeanour and shall be subjected to imprisonment not exceeding two years with no option of fine.

Under this code, any person who for trade or otherwise makes loud noise or offensive awful smell in such places and circumstances as to annoy any considerable number of persons in the exercise of their rights, commits an offence, and is liable to be punished for a common nuisance, i.e. imprisonment not exceeding one year with no option of fine. The contractor of the proposed road will therefore need to ensure that all emissions are controlled during the construction phase of the project to avoid interference on health of the local communities and the workers.

6.2.18 The Employment Act, 2007

The Employment Act, 2007 defines the fundamental rights of employees including the basic conditions of employment of workers. It also regulates employment of children. The contractor on site will have to employ casual labourers probably from the communities where the road traverses during construction.

The basic conditions of employees should be observed to avoid unnecessary conflicts during the construction works. The Contractor shall pay the entire amount of the wages earned by or payable to the workers. Payment of such wages should be done at the end of a working day at or near the place of work. The Contractor shall also ensure that all statutory deductions are submitted without delay to appropriate government agencies e.g. Kenya Revenue Authority, NSSF, NHIF, among others

6.2.19 Work Injury Compensation Benefit Act (WIBA) 2007

An act of Parliament to provide for compensation to employees for work related injuries and diseases contracted in the course of their employment and for connected purposes.
During the implementation of the proposed projects the provisions of this act will be referred to in case of work related injuries and diseases; appropriate compensation will have to be done.

6.2.20 Public Roads and Roads of Access Act Cap 399

The Public Roads and Roads of Access Act Cap.399 Act states that a public road is any road which the public has a right to use immediately before the commencement of this Act, or all proclaimed or reserved roads and thoroughfares being or existing on any land sold or leased or otherwise held under the East Africa Land Regulations, 1897, the Crown Lands Ordinance,1902, or the Government Lands Act at any time before the commencement of this Act and all roads and thoroughfares hereafter reserved for public use. The construction of the proposed road will need to take note of the provisions of this Act.

6.2.21 The Traffic Act Cap 403

The Traffic Act reserves the use of the road corridor for road facilities only. Any vegetation grown to protect the road edges should not cause problems during maintenance. Encroachment along the road corridor will have to be checked especially during the operational phase of the project. The Act also spells out conditions for use of roads by motorists, among others. The contractor's vehicles shall comply to all traffic rules in Kenya.

6.2.22 Building Code 2009

This by-law recognizes the county governments as the leading planning agencies. It compels potential developers to submit development applications for the approval. The county governments are hence empowered to approve or disapprove any plans if they do or don't comply with the law, respectively. Any developer who intends to erect a building must give the respective local authority a notice of inspection before the erection of the structure. On completion of the structure, a notice of completion shall be issued by the local authority to facilitate final inspection and approval. No person therefore shall occupy a building whose certificate of completion has not been issued by the county government.

Section 214 of the by law requires that any public building where the floor is more than 20 feet above the ground level should be provided with firefighting equipment that may include one or more of the following; hydrants, hose reels and fire appliances, external conations portable fire appliances, water storage tanks, dry risers, sprinkler, drencher and water spray spring protector system.

Section 194 requires that where sewer exists, the occupants of the nearby premises shall apply to the local authority for a permit to connect to the sewer and all the waste water must be discharged to the sewers. Finally, section 196 provides that the county government may refuse to admit to sewer any trade waste or any other effluent unless it has been treated in an approved manner. In this regard, the county government may cause the occupier of the premise to construct an approved manhole connected to the pipe conveying such effluent. In the development of the project, the proponent will have to comply with the provisions of this Act by complying to the Building code provisions.

6.2.23 The Kenya Roads Act, 2007

This is an Act of Parliament that provided for the establishment of Kenya Road Agencies i.e. Kenya National Highway Authority (KeNHA), the Kenya Urban Roads Authority (KURA) and the Kenya Rural Roads Authority (KeRRA), and provided powers and functions of the authorities.

KeNHA is mandated to manage, develop, rehabilitate and maintain all national roads. Other function vested to this authority relevant to the proposed project are: controlling national roads and road reserves and access to roadside developments; implementing road policies in relation to national roads; ensuring adherence to the rules and guidelines on axle load control prescribed under the Traffic Act (Cap. 403) and under any regulations under this Act; ensuring that the quality of road works is in accordance with such standards; in collaboration with the Ministry responsible for Transport and the Police Department, overseeing the management of traffic and road safety on national roads; collecting and collating all such data related to the use of national roads as may be necessary for efficient forward planning under this Act; monitoring and evaluating the use of national roads; planning the development and maintenance of national roads and liaising and coordinating with other road authorities in planning and on operations in respect of roads.

6.2.24 The Kenya Roads Board Act, 1999

The Act was assented in January 2000. Establishing a board to oversee the road network in Kenya and thereby coordinate its development, rehabilitation and maintenance and to be the principal adviser to the Government on all matters related to Road Development. The Standard Specifications for Road and Bridge construction has guidelines on environmental protection and mitigation. Standard Specification Clauses 116,117,125,135,137 specifically address protection of the environment, with regard to water, health, safety and accidents, water supply, maintenance of the engineers' staff houses, offices, laboratories, and attendance upon the engineer and his staff. The provisions of these standards and codes must not be contravened during project implementation. These provisions are largely supportive of EMCA, Cap 387 and forms part of the legal basis for environmental mitigation, avoidance, prevention, compensation, restoration and enhancement.

6.2.25 HIV / AIDS Act, 2006

Section 3 of The Act indicated the purpose of the legislation including public awareness and rights to people living with HIV/AIDS. Public awareness shall be achieved through education, public campaigns even at workplaces. This Act's provisions then give the guidelines unto which the project shall follow in educating workers and staff and providing of incentives to combat HIV/AIDs.

6.2.26 Urban Areas and Cities Act No 13 of 2011

This is an Act of Parliament to give effect to Article 184 of the Constitution, to provide for the classification, governance and management of urban areas and cities and to provide for the criteria of establishing urban areas. The Act also provide for the principle of governance and participation of residents of towns and cities. Under the Act a town is an urban area with a population of at least ten thousand residents. Also, under the Act the management of a city and municipality is vested in the county governments. The County Governments may impose such fees, levies and charges for delivery of services by the municipality or the city

6.2.27 The National Gender and Equality Act, 2011

National Gender Equality Commission is a constitutional Commission established by an Act of Parliament in August 2011, as a successor commission to the Kenya National Human Rights and Equality Commission pursuant to Article 59 of the Constitution. NGEC derives its mandate from Articles 27, 43, and Chapter Fifteen of the Constitution; and section 8 of NGEC Act (Cap. 15) of 2011, with the objectives of promoting gender equality and freedom from discrimination.
Gender mainstreaming in road projects ensures that the concerns of women and men form an integral dimension of the project design, implementation, operation and the monitoring and evaluation ensures that women and men benefit equally, and that inequality is not perpetuated.

6.2.28 The Sexual Offences Act, 2006 and its amendment 2012

Observing a standard work ethic is recommended to ensure persons from both genders are not subjected to sexual offences. Ample working environment should prevail in all work places in the project, to be enhanced through implementation of a Sexual Misconduct Policy.

6.2.29 Matrimonial Property Act (No. 48 of 2013)

Matrimonial property is property owned or obtained by either or both married spouses before or during their marriage. It is sometimes called 'matrimonial assets.' Matrimonial property includes the

matrimonial home; the home that the couple lived in during their marriage. It also includes many other things, not just physical property like land or houses but also things like the contents of the home, furniture and appliances, vehicles that a couple owns while married, and sometimes other things as well. It may include work pensions that either spouse may have, and certain debts that the parties have.

The law that deals with matrimonial property in Kenya is called the Matrimonial Property Act. This act only applies to married couples, or couples who are in a Registered Domestic Partnership. This act does not apply to common law couples.

When a married couple separates, either person can apply to the court to divide property, pensions, or debts. These issues, though, are usually dealt with during a divorce. It is important to speak to a lawyer for advice before dividing property, pensions, or debts. Once a couple is divorced, these issues are usually finished. You usually can't re-open them in the future if you've made a mistake. Compensation during resettlement needs to follows the legal provisions.

6.2.30 Persons with Disability Act, Chapter 133

This act protects the rights of people with disabilities ensuring they are not marginalized and that they enjoy all the necessities of life without discrimination. The act guarantees that:
(1) No person shall deny a person with a disability access to opportunities for suitable employment;
(2) A qualified employee with a disability shall be subject to the same terms and conditions of employment and the same compensation, privileges, benefits, fringe benefits, incentives or allowances as qualified able-bodied employees;
(3) An employee with a disability shall be entitled to exemption from tax on all income accruing from his employment.

A person with disability is entitled to exemptions which apply with respect to exemptions and deductions as described in Schedule 42 subsection (2) of the act, among other provisions within this act that should be complied with all parties involved.

6.2.31 Security Laws (Amendment) Act, 2014

This act entails a legal framework and jurisdiction on security matters. It is a constitutional entitlement to live and feel secure from agents that may compromise ones' life and safety. Security measures are vital in this project following past ethnic clashes experiences reported in the area; the contractor shall embark on a community policing program to be executed by a competent security firm. It is recommended that the government takes keen in providing adequate support to enhance the security of persons involved in this project and the community at large, which will translate to provision of critical intelligence that will trigger a review of the existing security measures and tactics, among other advantages such as security expertise and artillery.

6.3 National institutional / Administrative framework for the proposed project

There are various national institutions that are important in road project matters related to environmental management in Kenya. These are described in the following sections.

Table 6-3: National Institutions

Institution	Function
The National Environment Management Authority (NEMA)	The National Environmental Management Authority (NEMA) exercises general supervision and, coordination of all matters relating to the environment. NEMA is also the principal instrument of the government in the implementation of all policies relating to the environment. The Authority reviews EIA project and study reports for the proposed projects, visits the project sites to verify information provided in the report and issues EIA licenses if it considers that all the issues relevant to proposed projects have been identified and mitigation measures to manage them have been proposed.
The County and Sub-County Environment Committees	The County and Sub-County Environmental Committees contribute to decentralization of activities undertaken by NEMA. This has enabled local communities to have greater access to environmental management information. It has also enabled the County and Sub-County Environment Committees to conduct quick site visits and review of reports of proposed projects. Since the proposed project traverses through two Counties, the review of the report will be done at a National level for issuance of EIA license. However, it is also recommended that the EIA report should also be reviewed in each of the counties to create awareness and obtain ownership at county level. In fact, it is a practice and legal requirement that the review at County level be done before the ESIA Report is approved to NEMA.
Ministry of Transport, Infrastructure, Housing and Urban Development (MoTIHUD)	MoTIHUD is charged with the responsibility of providing basic infrastructure facilities to the public. These infrastructure facilities include development, rehabilitation and maintenance of the road network in the country. The Ministry will provide funding mechanisms and general guiding policies for this project.
The Kenya Roads Board (KRB)	The Kenya Roads Board was established in 2000 through an Act of Parliament (The Kenya Roads Board, 1999, No. 7) and mandated to do these functions, among others, to: co-ordinate the implementation of all policies relating to the development, rehabilitation and maintenance of the road network; co-ordinate the development, rehabilitation and maintenance of the road network with a view to achieving efficiency, cost effectiveness and safety; administer the funds derived from the fuel levy and any other funds that may accrue to it; monitor the operations or activities undertaken by road agencies in the development, rehabilitation and maintenance of roads and evaluate, by means of technical, financial and performance audits, the delivery of works and many other.
Kenya National Highways Authority (KeNHA)	KeNHA is a State Corporation established under the Kenya Roads Act, 2007 with the responsibility for management, development, rehabilitation and maintenance of national roads of class A, B and C. The proposed road will be managed by KeNHA since it's classified as Class A (A4). KeNHA has an established Environmental and Social Management Department to facilitate compliance of road projects with the requirements of environmental laws and regulations. This office advises KeNHA projects on various compliance issues. The office also has established linkages with NEMA. Projects contracts should be reviewed by this office directly or

Institution	Function
	through the environment supervisor. Regarding the implementation of the social and economic aspects of the ESMP, it is proposed that the Resident Engineer works closely with the Environmental and Social Manager of KeNHA to ensure compliance to national policies and guidelines.
Directorate of Occupational Safety and Health Services (DOSHS)	The Directorate of Occupational Safety and Health Services (DOSHS) is one of departments within the Ministry of Labour and East African Community Affairs, whose primary objective is to ensure safety, health and welfare of all workers in all workplaces. Unsafe and unhealthy work environment causes accidents, diseases, disasters and environmental pollution that occasion huge economic and social burdens to individuals and enterprises thereby stifling economic and social growth. DOSHS will provide OSH permits for workplaces of the project including campsites and quarries.
Kenya Wildlife Service (KWS)	KWS is a state corporation that was established with the mandate to conserve and manage wildlife in Kenya, and to enforce related laws and regulations. It undertakes conservation and management of wildlife resources across all protected and unprotected areas systems in collaboration with stakeholders. KWS will guide and monitor road construction through animal migratory routes.
Water Resources Authority (WRA)	Water Resources Authority (WRA) is a state corporation established under Section 11 of the Water Act, 2016. Pursuant to Section 6 of the Act, the Authority is an Agent of the National Government responsible for regulating the management and use of water resources. The Water Act, 2016 makes extensive provisions on the Authority's role in regulating the use and management of water resources. WRA was operationalized on 21st of April, 2017 vide Gazette Notice No. 59. However, the Authority has been in existence for 12 years following its establishment under the Water Act, 2002 as Water Resources Management Authority (WRMA). WRA will provide the necessary borehole and water extraction permits from local laggas.
Kenya Forest Service (KFS)	KFS is a corporate body established under the Forest Conservation and Management Act of 2016. The Act which was operationalized on 31st March 2017, gave the Service's mandate as "to provide for the development and sustainable management, including conservation and rational utilization of all forest resources for the socioeconomic development of the country and for connected purposes". The revegetation of areas cleared for the project and material sites will be guided by regional KFS officers, especially in terms of the best tree species.
The National Museums of Kenya (NMK)	NMK is a state corporation established by an Act of Parliament, the National Museums and Heritage Act, 2006 no. 6 of 2006. NMK is a multi-disciplinary institution whose role is to collect, preserve, study, document and present Kenya's past and present cultural and natural heritage. This is for the purposes of enhancing knowledge, appreciation, respect and sustainable utilization of these resources for the benefit of Kenya and the world, for now and posterity. NMK will provide guidelines in case any discoveries or existing cultural and natural heritage resources within the project area.
National Land Commission (NCL)	NLC manages public land on behalf of the national and county governments, initiates investigations into present or historical land injustices and recommend appropriate redress, and monitor and have oversight responsibilities over land use planning throughout the country. It will

Institution	Function
	undertake a key role in delivering land acquired through compulsory acquisition for the project.

6.4 International conventions and guidelines

There are number Multi-Lateral Environmental Agreements (MEAs) that are relevant to the proposed project. These are described in the following section.

6.4.1 Vienna Convention on the Protection of the Ozone Layer

This was an Intergovernmental negotiation for an international agreement to phase out ozone depleting substances concluded in March 1985 which saw the adoption of the Vienna Convention for the Protection of the Ozone Layer. This Convention encourages intergovernmental cooperation on research, systematic observation of the ozone layer, monitoring of CFC production, and the exchange of information.

6.4.2 United Nations Convention on Biological Diversity (UNCBD)

The purpose of this convention is to ensure the conservation and sustainable use of biodiversity. Kenya signed the convention on 5th June 1992 and ratified the same on 26th July 1992. The National Environment Management Authority (NEMA) is the National Focal Point to this Convention. The provisions of this Convention have been integrated in many laws of Kenya.

6.4.3 African Convention on the Conservation of Nature and Natural Resources

This convention reaffirms the importance of natural resources both renewable and non-renewable, particularly the soil, water, flora and fauna. The main objective is to facilitate sustainable use of the above resources. The convention was adopted in Algiers on 15th September 1968 and came into force on 16th June 1969.

6.4.4 Convention on International Trade in Endangered Species

This Convention was adopted on 3rd March 1973 and came into force on 1st July 1975. The purpose of the Convention is to regulate the international trade in wild plants and animals that are at risk of extinction because of trade. The Convention seeks to control trade not only in live species but also in dead specimen and their derivatives. The Kenya Government ratified CITES on 13th December 1978. The lead agency for the CITES in Kenya is the Kenya Wildlife Service (KWS).

6.4.5 The World Commission on Environment and Development (The Brundtland Commission of 1987)

The Commission in its 1987 report dubbed “Our Common Future” focused on the environmental aspects of development, the emphasis on sustainable development that produces no lasting damage to the biosphere and to ecosystems. In addition to environmental sustainability is economic and social sustainability. Economic sustainable development is development for which progress towards environmental and social sustainability occurs within available financial resources. While social sustainable development is development that maintains the cohesion of a society and its ability to help its members work together to achieve common goals, while at the same time meeting individual needs for health and well-being, adequate nutrition, and shelter, cultural expression and political involvement. The key aspect of sustainability is the interdependence of generations.

6.4.6 The Ramsar Convention for the conservation and sustainable utilization of wetlands

The Ramsar Convention (formally known as the Convention on Wetlands of International Importance, especially as Waterfowl Habitat) is an international treaty for the conservation and sustainable utilization of wetlands, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value. The proposed road has potential of impacting Lake Turkana. Appropriate mitigation measures will need to be implemented as detailed in the Environmental Management Plan.

6.4.7 United Nations Convention to Combat Desertification (UNCCD)

The above Convention was adopted on 17th June 1994 in Paris and came into force on 26th December 1996.Kenya ratified the Convention in 24th June 1997. The purpose of the UNCCD is to address the problem of the degradation of land by desertification and the impact of drought particularly in arid and dry semi-humid areas. NEMA is the focal point for the Convention.

6.4.8 The 1992 United Nations Framework Convention on Climate Change (UNFCCC)

The primary purpose of the convention is to establish methods to minimize global warming and the emission of the greenhouse gases. The UNFCCC was adopted on 9th May 1992 and came into force on 21st March 1994. The Convention has been ratified by 189 states. Kenya ratified the Convention on 30th August1994. NEMA is the focal point for the Convention.

6.4.9 The Paris Agreement

This agreement was adopted on 12th December 2015 at the 21st session of the Conference of the Parties to the United Nations Framework Convention on Climate Change in Paris, it then came into force on 4th November 2016 after meeting the ratification threshold. The Agreement provides the framework to address climate change for a safer and sustainable future, it has an objective of preventing a global temperature increase above 1.5 degrees Celsius relative to pre-industrial levels by reduction of Greenhouse gas emissions. Kenya ratified the Paris Agreement and welcomed it into force on 28th December 2016. As at now a total of 171 parties out of 197 have ratified the agreement.

6.4.10 Rio Declaration on Environment and Development

The Rio Declaration on Environment and Development, often shortened to Rio Declaration, was a short document produced at the 1992 United Nations "Conference on Environment and Development" (UNCED), informally known as the Earth Summit. The declaration aimed at establishing a new and equitable global partnership through the creation of new levels of co-operation among States, key sectors of societies and people, working towards international agreements which respect the interests of all and protect the integrity of the global environmental and developmental system, recognizing the integral and interdependent nature of the Earth, our home. The Rio Declaration consisted of 27 principles intended to guide countries in future sustainable development. It was signed by over 170 countries.

Principle 17 of the Rio Declaration provides key relevance to the proposed project; the principle denotes that environmental impact assessment as a national instrument shall be undertaken for proposed activities that are likely to have a significant impact on the environment and are subject to a decision of a competent national authority.

6.4.11 Earth Summit on Sustainable Development Agenda 21

Agenda 21 is a non-binding, voluntarily implemented action plan of the United Nations regarding sustainable development. It is a product of the Earth Summit (UN Conference on Environment and Development) held in Rio de Janeiro, Brazil, in 1992. It is also regarded as an action agenda for the UN, other multilateral organizations, and individual governments around the world that can be executed at local, national, and global levels. The "21" in Agenda 21 refers to the 21st Century. Agenda 21 Section I on Social and Economic Dimensions is directed toward combating poverty, especially in developing countries, changing consumption patterns, promoting health, achieving a more sustainable population, and sustainable settlement in decision making.

Section II on Conservation and Management of Resources for Development Includes atmospheric protection, combating deforestation, protecting fragile environments, conservation of biological diversity (biodiversity), control of pollution and the management of biotechnology, and radioactive wastes.
Section III focuses on strengthening the Role of Major Groups including the roles of children and youth, women, NGOs, local authorities, business and industry, and workers; and strengthening the role of indigenous peoples, their communities, and farmers. Kenya continues to implement Agenda 21 to support sustainable development through the integration of environmental concerns into the national development policies, plans, and programmes. Also relevant is the implementation of Agenda 17. The proposed project would need to be consistent with the objectives of Agenda 21.

6.4.12 Convention on the Rights of the Child

The Convention on the Rights of the Child (CRC), 1989 is the most comprehensive compilation of international legal standards for the protection of the human rights of children. The CRC is also the most widely ratified international human rights treaty, ratified by all countries in the world, apart from two.

The Convention acknowledges children as individuals with rights and responsibilities according to their age and development (rather than the property of their parents or as victims), as well as members of a family and community. Underlying the Convention are four main principles: non-discrimination, the best interests of the child, the right to life, survival and development and the right to participation.

6.4.13 Convention on the Elimination of all forms of Discrimination against Women

The Convention on the Elimination of all forms of Discrimination against Women (CEDAW) places explicit obligations on states to protect women and girls from sexual exploitation and abuse. Universal Declaration of Human Rights (Article 7), the UN Charter (Articles 1, 13, 55, and 76) and the International Covenant on Civil and Political Rights (Article 24) reaffirm the freedoms and rights of all children, including internally displaced children.

6.4.14 International Labour Organization

The International Labour Organization (ILO) is built on the constitutional principle that universal and lasting peace can be established only if it is based upon social justice. The ILO has generated such hallmarks of industrial society as the eight-hour working day, maternity protection, child-labour laws, and a range of policies which promote workplace safety and peaceful industrial relations.

The ILO has four principal strategic objectives:

- To promote and realize standards, and fundamental principles and rights at work;
- To create greater opportunities for women and men to secure decent employment;
- To enhance the coverage and effectiveness of social protection for all;
- To strengthen tri-parties and social dialogue.

The key ILO Conventions applicable to the proposed road project include:

- Equal Remuneration Convention (1951) (No. 100) - Calls for equal pay and benefits for men and women for work of equal value;
- Discrimination (Employment and Occupation) Convention (1958) (No. 111) - Calls for a national policy to eliminate discrimination in access to employment, training, and working conditions, on grounds of race, colour, sex, religion, political opinion, national extraction or social origin, and to promote equality of opportunity and treatment;
- Minimum Age Convention (1973) (No. 138) - Aims at the abolition of child labour, stipulating that the minimum age for admission to employment shall not be less than the age of completion of compulsory schooling;
- Worst Forms of Child Labour Convention (1999) (No. 182) - Calls for immediate and effective measures to secure the prohibition and elimination of the worst forms of child labour which include slavery and similar practices, forced recruitment for use in armed conflict, use in prostitution and pornography, any illicit activity, as well as work which is likely to harm the health, safety, and morals of children.

6.4.15 Sustainable Development Goals (SDGs)

The Sustainable Development Goals (SDGs) are a new, universal set of goals, targets and indicators that UN member states will be expected to use to frame their agendas and political policies over the next 15 years. The SDGs include 17 Sustainable Development Goals and 169 targets. The 17 sustainable development goals (SDGs) include

- GOAL 1: No Poverty;
- GOAL 2: Zero Hunger;
- GOAL 3: Good Health and Well-being;
- GOAL 4: Quality Education;
- GOAL 5: Gender Equality;
- GOAL 6: Clean Water and Sanitation;
- GOAL 7: Affordable and Clean Energy;
- GOAL 8: Decent Work and Economic Growth;
- GOAL 9: Industry, Innovation and Infrastructure;
- GOAL 10: Reduced Inequality;
- GOAL 11: Sustainable Cities and Communities;
- GOAL 12: Responsible Consumption and Production;
- GOAL 13: Climate Action;
- GOAL 14: Life Below Water;
- GOAL 15: Life on Land;
- GOAL 16: Peace and Justice Strong Institutions;
- GOAL 17: Partnerships to achieve the Goal.

The GOALs seek to build on the Millennium Development Goals that expired in 2015. Most notably SDGs are integrated, indivisible and balance the three dimensions of sustainable development: the economic, social and environmental. This road project is expected to cut-across the three dimensions of sustainable development hence making SDGs a key reference point. The SDGs are also linked to several Kenyan legal frameworks such as Water Act, Forestry Act, and EMCA Cap 387.

7. PUBLIC PARTICIPATION

This Chapter describes the process of public consultation and participation that were followed to identify the key issues and impacts of the proposed project. Stakeholder Engagement and Public Participation Process is an integral aspect of successful decision making in the ESIA processes for major developments. Public participation is a key requirement as stipulated in Article 69 Section 1 of the Kenyan Constitution, 2010, Legal Notice 101 of the Environmental Management and Coordination Act (EMCA), 1999, Section 3 of the EIA/EA regulations, 2003 and Section 87 & 113 of the County Governments Act, 2012.

Stakeholder Engagement and Public Participation is also necessary for Category 'B' projects provided under World Bank Safeguards Policies. OP/BP 4.01 Environment Assessment requires stakeholder engagement of project affected persons (PAPs) in the preparation/designing and implementation of World Bank financed projects. It is an important process through which stakeholders including beneficiaries and members of public living in project areas (both public and private), are given an opportunity to contribute to the overall project design by making recommendations and raising concerns projects before they are implemented. In addition, the process creates a sense of responsibility, commitment and local ownership for smooth implementation.

7.1 Objectives for consultation and public participation

The general objectives of the consultation and public participation were to:

- Disclose and inform the stakeholders about the project with special reference to its key components and location;
- Create awareness among the public on the need for the ESIA for the proposed project;
- Gather comments, suggestions and concerns of the interested and affected parties.
- Incorporate the information collected in the ESIA study.

7.2 Methods used for consultation and public participation

The public consultation and participation was conducted through:

- Household socio-economic survey;
- Key stakeholder interviews;
- Key stakeholder Meeting (Maralal and Marsabit)
- Public Meetings;
- Focused Group Discussions.

The procedures used for each of the above are outlined below;

7.2.1 Household Socio-Economic Survey

Random Household Socio-economic surveys were conducted during the field visit. This was done using structured questionnaires (Questionnaire attached in the Appendices section) to assess the socioeconomic status of the project area.

7.2.2 Key stakeholder interviews

Key Stakeholder Interviews were conducted on 15th of January 2019 at Samburu County Commissioner's office and 29th January 2019 at Marsabit County Commissioner's office The key stakeholder engagements were conducted to foster better and mutual understanding of public concerns as well as incorporate key stakeholders' opinions regarding the proposed road project.

Table 7-1: Key stakeholders' meetings at County Commissioner's Offices in Maralal and Marsabit


Key stakeholder meeting at the County Commissioner's office in Maralal, Samburu County


Key stakeholder meeting at the County Commissioner's office in Marsabit, Marsabit County

7.2.3 Focused group discussion (FGD)

FGDs were conducted for specific groups of people such as youth, women and the elderly within the community. A structured guideline was used to get their specific views with regards to the project. Views from the local community, local leaders, surrounding institutions and development partners for the proposed upgrade of the Baragoi – North Horr road, who in one way or another would be affected or have interest in the proposed project were sought through interviews and public meetings as stipulated in the Environment Management and Coordination Act, EMCA Cap 387.

Table 7-2: The FGDs were held at the following areas

Area	Number of attendants	Date
County Commissioner's office at Maralal	10	15th/Jan/2019
Loruko	14	17th/Jan/2019
Anderi	16	22nd/Jan/2019
El-Molo bay	13	25th/Jan/2019
County Commissioner's office at Marsabit	5	29th/Jan/2019

7.2.4 Public meetings

Fifteen (15) public participation meetings were conducted along the proposed road project. The local Chief, Sub-chiefs, Ward Administrators and Head Men were used to mobilize the public to attend the meetings. The announcements for the meetings were made by phone calls, announcement at centres and village settlements, in places of worship and chiefs barazas. A total of 872 people participated in the meetings while 450 questionnaires were administered to capture the key concerns of stakeholders along the road corridor. The minutes of the meetings will be appended in the main report. Summary of attendance list found in the table below.

Table 7-3: Summary of the Attendance of Public Participation Meetings

S/No	Centre/ Area	Number of Participants	Date
1	Maralal Sub-County	10	15th/Jan/2019
2	Baragoi	84	16th/Jan/2019
3	Loruko	28	17th/Jan/2019
4	Lmerim	14	18th/Jan/2019
5	South Horr	160	19th and 21st Jan/2019
6	Kurungu	70	21st/Jan/2019
7	Anderi	46	22nd/Jan/2019
8	Ntaletiani	26	22nd/Jan/2019
9	Olroji	47	22nd/Jan/2019
10	Sarima	84	23rd/Jan/2019
11	Loiyangalani	141	24th/Jan/2019
12	El-Molo Bay	56	25th/Jan/2019
13	Gus Centre	41	26th/Jan/2019
14	North Horr	60	28th/Jan/2019
15	Marsabit County	5	29th/Jan/2019

Table 7-4: Public and Focused Group Discussions Meetings Photographs

 Public Meeting in Baragoi Township	 Public Meeting held in Loruko
 Public meetingheld in Sere Nyamruk, South Horr	 Public meeting held in South Horr centre
 Public Meeting held in Kurungu, South Horr	 Public participation meeting held at Anderi, South Horr

 Public participation meeting in Ntaliatiani	 Public Participation meeting in Loonjorin
 Public participation meeting in Sarima	 Public Participation meeting held in Loiyangalani
 Public Participation meeting held in El Molo	 Public Participation Meeting held in Gus Town
 Public Participation meeting held in North Horr	

7.3 Comments obtained during the public consultation meetings:

This section provides a summary of the positive impacts of the proposed Baragoi – North Horr road project as expressed by the stakeholders who were interviewed during the meetings.

7.3.1 Creation of employment opportunities

The residents expressed that the construction and operation of the road would lead to job opportunities for locals. During construction, drivers, masons, engineers, steel-fixers, carpenters will gain employment. The stakeholders expressed that priority of employment opportunities for skilled, semi-skilled and unskilled labour should, be given to the local community. Although women highly expressed interest to prepare food for the workers within the project site, a significant number indicated as having equal skills and hence should be considered for all available existing opportunities. In any of the cases, where local community do not have adequate or none of the skilled labour, the communities agreed that such can be sourced from outside the region. It was further agreed that the modalities and quotas for employment for different area be agreed upon by the local community, local administration and the contractor through a local committee.

7.3.2 Increased business opportunities

The public and stakeholders suggested that the road would open the area to investors and this will lead to growth of new and older market centres and towns. There will also be improved transportation of business goods thereby improving business in the area.

7.3.3 Improved social infrastructure

The public explained that the road would lead to growth of water, electricity and telecommunication infrastructure in the area. They also specified that Corporate social responsibility (CSR) activities such as drilling of boreholes and water piping, building of markets, schools, gathering halls, Soil erosion prevention, will improve the area infrastructure.

7.3.4 Faster means of transport

The public and stakeholders affirmed that the road will result in the shortening of travel and reduction of the cost of transportation in the area. This will lead to an increase in the speed of transacting business hence saving money.

7.3.5 Cheap / affordable fares

The members noted that the improved road would reduce hours spent via public means hence resulting to affordable fares.

7.3.6 Easy and fast movement of people

The public noted that the road will result in faster and speedy movements between Baragoi and North Horr.

7.3.7 Easy and fast movement of goods

The tarmacking of the road will thus make the road passable in all times of the year making it easy to transport goods.

7.3.8 Interaction of people from different communities

The residents were positive that the road will lead to an influx of people from different places in the area. The road stretch is currently inhabited 90% by people from local communities. The communities said that the interaction of these different communities would lead to a growth of the area and will have many positives than negatives.

7.3.9 Growth of towns

The local community suggested that the road will lead to growth of towns and centres. This will result to development of the area.

7.3.10 Potential for increased economic activities

The residents are optimistic that upon completion of the road project, that more opportunities for business will be realised. Another additional benefit will be improved efficiency of delivery of Fish, livestock to markets within and out of their areas will be more efficient and withstand all weather conditions. Improved roads condition to bitumen standards means that costs of travel from one point to the other will be lowered because of shorter time taken to travel. Break down and maintenance costs associated with roads conditions will also be reduced. This means that the returns to the residents will be higher than the current case.

7.3.11 Transfer of skills

The public was optimistic that the construction of the road will bring people of different professions and skills to the area. They noted that these skills would be transferred to local youth in the area. Suggestions were also put for scholarships and trainings to be offered for the locals by the contractor.

7.3.12 Improved security

The community expressed that once complete, the road would enhance accessibility hence improved security surveillance within the region. They particularly expressed that the security operators take long to respond due to poor road infrastructure.

7.4 Negative concerns of the stakeholders

7.4.1 Increased Accidents

Since the area is inhabited by pastoralists, the public said that animals graze in many areas along the road stretch and these could lead to animal accidents. The locals suggested that to minimize this, side paths and underpasses such as culverts should be created along the road close to livestock grazing and watering areas so as to minimize accidents, guard rails to be put along dangerous places to avoid livestock from crossing the road at these points, erect speedbumps, and rumble strips near village and town centres and livestock crossing points, signage should be provided throughout the road length and especially in the major towns and villages and construct culverts at strategic points for livestock crossing.
The public also stated that public sensitization and awareness on road use and safety should be conducted. This was further affirmed by the consultant.

7.4.2 Impact on water resources

The public had mixed reactions that the road project will lead to competition on the few available water resources that they use for their domestic needs. WRMA County Sub-Regional manager should be consulted prior to drilling of any boreholes or abstraction of any water resource.

The residents said that the contractor should drill boreholes closer to their villages and centres for the water to also benefit the community. All drilled boreholes should be surrendered to the community after the completion of the project.

7.4.3 Noise pollution

The public stated that construction activities would result to noise pollution. Vibrations and noise from the construction machinery may be excessive and result into noise around and within the area.
The public were notified that the Contractor will abide by the Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control) Regulations, 2009 Legal Notice No. 61 and the OSHA, 2007.

7.4.4 Dust generation

The public said that the excavation, quarrying and borrow works during construction will result to air pollution through dust generation. The consultant assured the residents that the contractor will mitigate air pollution through the sprinkling of water on dusty roads, putting speed limits for vehicles and providing personal protection equipment (PPEs) for the workers.

7.4.5 Water pollution

The project road crosses some water bodies springs and laggas. During construction, these resources may be exposed to silt-laden run-off, chemical/fuel spillages and leaks from plant and machinery, and from chemicals and other pollutants (e.g. cement, paints, etc.) used/stored on site, localised erosion of banks and beds of watercourses when works are required in their proximity (e.g. reconstruction of crossings); and inappropriate disposal of foul water from the construction site giving the impact a high magnitude. The community informed that, the Counties are water scarce and therefore conservation of these water resources is vital because the community depends on them.

7.4.6 Waste disposal and spoils

The public stated that the workers campsites, borrow pits and quarries would produce waste and spoils. They stated that the area is free from solid waste pollution and thus the contractor should ensure that they leave the environment clean.
The public was assured that the contractor will dispose all generated waste by ensuring that all waste is properly collected and disposed as per existing legal requirement to ensure a clean and healthy environment for all.
Consultant assured residents excavated soil from the road will be dumped at the excavated borrow pits and quarries. The contractor will handle used oil carefully.
Recycling of construction material shall be practiced where feasible e.g. containers and cartons.

7.4.7 Loss of vegetation cover

The public stated that the road will lead to clearance of vegetation and trees along the road reserve and in areas where borrow pits and campsites will be put. They suggested that the contractor should replant any cut trees and revegetate cleared areas.

7.4.8 Climate change and potential Impacts on road project

Over the recent years there are frequent droughts, floods and other extreme weather events. A slight increase in rainfall and given the number of laggas that the project road crosses renders the need for the road design to cater for floods and accommodation of high flow volumes along the laggas.
The consultant informed that, there will be cross-drainage design that accommodates 50-year flood return periods. Designing road infrastructure that can withstand the prevailing climate changes and the ones to come these include structures that can withstand high rainfall, strong winds as well as temperature. Networks could be designed to ensure that the road structure is climate-proof over its life span.

7.4.9 Loss of pasture for livestock and wildlife

The public stated that the excavation and construction of the road will result in removal of grass and tree pasture permanently in grazing areas for their livestock. Thus, loss of pasture for both the livestock and wildlife will take place. The excavation of various sites for collection of construction material will result in a permanent loss if the areas are not filled and the tree and grass cover re-established. Consultant assured the cut trees will be identified and will be compensated during road construction.

7.4.10 Displacement of local communities and loss of property

The public stated that since the right of way (RoW) for the road is going to be changed to 60m most of their property will be destroyed and many people will be displaced. There was an issue on how compensation will be done since most of them did not have title deeds for their land parcels.
The consultant assured the public that a detailed resettlement action plan (RAP) will be conducted for property valuation and compensation. Further it was highlighted that Article 63 of the Constitution of Kenya, 2010 (the Constitution) provides for classification of land known as Community land providing for the recognition, protection and registration of community land rights. They were also told that a detailed RAP study will be conducted for property valuation and compensation.

7.4.11 Disruption and loss of businesses

Business people along the sections of the road in Baragoi, South Horr, Loiyangalani, Gus and North Horr centres said that the construction of the road will lead to a disruption of their businesses. They said that some of their buildings and kiosks will be demolished for the construction of the road.
The consultant assured them that a detailed RAP and valuation study will be undertaken to restore their livelihoods. Also the community was informed some centres a bypass will be constructed and a loop through the town will be constructed to avoid major disruption and losses.

7.4.12 Cultural erosion

The public anticipated that the influx of new people and communities in the area because of the road will lead to loss of their cultural values and traditions.

The consultant assured the public that no significant cultural resource will be interfered without consultations with the community elders.

7.4.13 Increase in the spread of STD, HIV and AIDS

The residents along the proposed road expressed concern that there would be an increase in incidences of sexually transmitted diseases including HIV and AIDS especially during construction of the road because of increased prostitution. The project proponent will need to work jointly with appropriate county and national government public health agencies to come up with a comprehensive STD, HIV and AIDs control programme during the construction and operational phases of the project.

The Consultant informed the community that:

- Awareness creation, prevention and training programmes on HIV/AIDS upon commencement of works will be initiated;
- Wellness centres including VCT and AVR centres at strategic locations of the project road will be stablished;
- Will incorporate HIV/AIDS control program as part of the construction deliverables;
- HIV/AIDS Awareness Program and other communicable diseases to be instituted and implemented as part of the Contractor's Health and Safety Management Plan to be enforced by the Supervising Engineer;
- This will involve periodic HIV/AIDS and other communicable diseases Awareness Workshops for Contractor's Staff;
- Access to Contractor's Workforce Camps by outsiders to be controlled;
- Contractor to provide standard quality condoms to personnel on site.

7.4.14 Safety and Health

Occupational health and safety: - Health risk and work safety are concerns at any construction site. Others can be caused by storage, handling and transport of hazardous construction material. The Consultant informed the community that: The contractor will provide the workers with appropriate personal protective equipment at all times while on site**.** Contractor will ensure there are warning signs on the construction site and on the road to protect from accidents. Contractor will provide standard first aid kits at the site. Safety officer who has safety training and knowledge of safety procedures will be present on site to ensure that all workers have guidance on the safety procedures**.** The contractor will have an insurance cover for all workers**.** The contractor will comply with all the Occupational Safety and Health Act 2007 regulations and ILO on safety and public health in construction activities.

Community Health and safety: - Increased movement of vehicles may lead to increased accidents involving the public. Small centres within the project area may also be of safety concern due to relatively dense settlements. Increased traffic speeds due to the improved road may only make this situation worse and result in more accident cases. However, this impact can be rated medium to low if appropriate mitigation measures are implemented. The Consultant informed the community that; Speed humps will be provided in the various centres, Adequate road signage of ongoing works will be provided, any chemical or fuel spills shall be cleaned up immediately, safety and emergency response plan will be developed for all operations with emphasis on the protection of the environment prior to start up.

7.4.15 Vulnerable and Marginalized Groups (VMGs)

The proposed project road traverses through Arid and Semi-Arid Lands dominated which are mainly pastoralist while the other category was for fishermen (El-Molo) settled along Lake Turkana. These communities are classified as Vulnerable and Marginalized according to according to OP 4.10 are categorized as Vulnerable and Marginalized and Kenyan Constitution 2010. The public were notified that the Kenya Constitution, 2010 gives attention to women, youth and other vulnerable groups and the contractor will factor in these groups.

The Consultant informed:

- To sensitize community members about the Project and consult VMGs continuously on the design of the project so that it turns out relevant, culturally appropriate and responsive to their needs and aspirations;
- To provide employment quarters for VMGs especially in unskilled or semi-skilled cadres during Project implementation;
- To provide support infrastructures for VMGs such as establishment of clean water along the road alignment;
- Support and facilitate the use of customary institutions for grievance and complaints handling that might arise during Project implementation.

7.4.16 Human Right and Gender Inclusivity

This impact is triggered during Project Construction Phase due to the potential of the Contractor's failure to comply with the following provisions:

- Gender Inclusivity requirements in hiring of workers and entire Project Management as required by Gender Policy 2011 and 2/3 gender rule;
- Failure to protect Human Risk areas Associated with, Disadvantaged Groups, Interfering with Participation Rights, and interfering with Labour Rights.

The Consultant informed to mitigate this:

- Mainstream Gender Inclusivity in hiring of workers and entire Project Management as required by Gender Policy 2011 and 2/3 Gender Rule;
- The existing community structures headed by location chiefs should be involved in local labour hire, emphasize the requirement of hiring women, youth and people with disability;
- Protecting Human Risk areas Associated with, Disadvantaged Groups, Interfering with Participation Rights and interfering with Labour Rights.

7.4.17 Child Protection

The possibility of contractor children abuse is through hiring of child labour, also labour force on site might abuse children within the Project area through sexual advance that could lead to early pregnancies and school dropout including exposure to communicable diseases such as HIV and AIDS.

The consultant informed that the contractor will undertake the below listed mitigation measures.

- Develop and implement a Children Protection Strategy that ensures minors are protected against negative impacts associated by the Project;
- All staff of the contractor must sign, committing themselves towards protecting children, which clearly defines what is and is not acceptable behaviour;
- Children under the age of 18years should not be hired on site as provided by Child Rights Act (Amendment Bill) 2014.

7.5 Corporate social responsibility and social infrastructure

The public suggested that since the area is a marginalized area and social infrastructure is not developed, the contractor should consider ways of giving back to the community to enhance the development of the area.

The public were notified that the financier has a component for Corporate Social Responsibility and Social Infrastructure as a means for ensuring social development in the area. A budget will be set aside for these activities. The following projects were to be given priority as suggested by the locals:

- **Water:** Construction of boreholes, and water pans since the area is a water stressed area. Many residents suggested that boreholes should be drilled with consultation from the communities.
- **Education:** In many of the public meetings residents suggested that extra classrooms in Public Primary and Secondary Schools should be constructed due to lack of educational infrastructure in the area. Loiyangalani preference was set on the construction of a Technical Training Institute. The public also said that scholarship opportunities should be offered to the locals.
- **Health:** Most of the public lamented that they travel for long distances to seek for medication and the construction of health centres should be prioritized at El- Molo bay, Gus Centre, Loruko, Kurungu, Anderi and Kurungu Locations.
- **Markets:** The residents suggested that markets should be constructed at all the market centres along the road.
- **Laga Erosion:** Residents of South Horr suggested that a soil erosion prevention within the town because the laga passing across the town is eroding their town at high speed.

8. CLIMATE CHANGE

8.1 Climate Change Phenomenon

Climate change means a change in the climate system which is caused by significant changes in the concentration of greenhouse gases as a consequence of human activities and which is in addition to natural climate change that has been observed during a considerable period.

Kenya has enacted the Climate change act, 2016 which provides regulatory framework for enhanced response to climate change and provides for mechanisms and measures to achieve low carbon climate development.

8.2 Project activities likely to contribute to climate Change

- The proposed road construction activities including;
- Transport of materials using vehicles which may lead to greenhouse gas emissions within the project area beyond the normal limits
- Cutting of vegetation to clear the way for the road.
- Displacement of people along the right of way
- Emissions form fuel consuming plant equipment including batching plants and asphalt laying pavers.
- Erosion of the earth surfaces due to increased runoff and channelling of water into existing drains
- Undercutting of shrines and other protected sites within the project locality my lead to increased vulnerability of the communities to climate change.
- Burning of solid wastes and other products from the construction activities including tyres and cement bags may be a source of GHGs

8.3 Proposed Climate Change intervention for the proposed project

The proposed project should integrate climate change adaptation and sustainable development approached in its implementation. This Environmental and Social Impact Assessment should form a basis of ensuring proper mitigation of adverse impacts to the environment. Other strategies that are recommended in climate change adaptation are;

- Burning of wastes should be prohibited on all sites during the construction phase of the project road
- All machinery and equipment should use unleaded fuel and be serviced regularly to limit cases of incomplete combustion
- Recycling reuse and reduction of waste at source should be applied
- The corporate social responsibility should be implemented providing the communities with water points, schools and hospitals to enhance the resilience of the local communities
- Tree cutting should be limited to only the right of way of the road
- Compensatory measures should be provided for those displaced with the project in order for them to live better even after the project.
- The proposed project should be designed to make maximum use of renewable energy including wind and solar. The project location has high solar insolation this can be tapped for use as solar lighting for the construction camps and latter street lighting for the road.

9. POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

The proposed Baragoi – North Horr road will have both positive and negative environmental and social impacts. Through an intensive and extensive field visits/ survey, key stakeholder consultation social survey and public participation forums conducted on the proposed project area, the impacts were identified. The impacts were categorised according to different phases of the project i.e. construction, operation and decommissioning phases.

The negative and positive impacts likely to originate from the project are generally linked to the social and biophysical environment and also the economic aspects along the area that the road will traverse.

Table 9-1: The broad linkages

Biophysical Environment	▪ Biodiversity: Flora and Fauna. ▪ Water: hydrology of the area. ▪ Land and Soil. ▪ Climate and Weather II.
Social Environment:	▪ Population characteristics. ▪ Settlement trends. ▪ Land use patterns. ▪ Health and Safety. ▪ Culture.
Economic Issues:	▪ Trade and industries. ▪ Transportation and communication. ▪ Income generation activities.

The magnitude and significance of impacts were based on the following factors:

- Location or extent: The area/volume covered.
- Timing: Whether immediate or delayed.
- Duration: Short term, long term, intermittent or continuous.
- Reversibility or irreversibility.
- Likelihood: Probability of the impact taking place.
- Significance: Whether it is local, regional or global.

To make the following observation, expert knowledge based on the magnitude of the predicted impacts was relied upon. The scale that was applied in the analysis of impacts is shown in the table below.

Table 9-2: Levels of Scale used in the Analysis of Impacts

Value	Description	Scale Description
0	No impact	This means that to the best knowledge of the expert, the activity/action will not have any known impact on the environment. Such an impact will not in any way affect the normal functioning of either the human or the natural systems and does not therefore warrant any mitigation.

Value	Description	Scale Description
1	Minimal impact	Any activity with little impact on the environment calls for preventive measures, which are usually inexpensive and manageable. Such activities have minimum impacts on either natural or human environment or both.
2	Moderate impact	A moderate impact will have localized effect on the environment. If the effect is negative and cumulative, action in form of mitigation measures needs to be put in place to ensure that it doesn't become permanent and /or irreversible.
3	High impact	An impact is high if it affects a relatively high area (spatial), several biological resources (severity) and/or the effect is felt for a relatively long period (temporal) e.g. more than one year. In case the effect is negative, such an impact needs to be given timely consideration and proper mitigation measures put in place to prevent further direct, indirect or cumulative adverse effects.
4	Very high impacts	Such an activity rates highly in all aspects used in the scale i.e., temporal, spatial and severity. If negative, it is expected to affect a huge population of plants and animals, biodiversity in general and a large area of the geophysical environment, usually having trans-boundary consequences. Urgent and specialized mitigation measures are needed. It is the experts' opinion that any project with very high negative impacts MUST be suspended until sufficient effective mitigation measures are put in place.
5	Not known	There are activities for which impacts are not yet known e.g. some chemicals are suspected to produce carcinogenic effects, but this has not yet been confirmed.

9.1 Positive environmental and social impacts during construction phase

The following are the expected positive environmental and social impacts for the proposed Baragoi – North Horr road project during the construction phase:

9.1.1 Creation of employment opportunities

The construction phase of the road, will offer job opportunities for both skilled and unskilled locals in the area. The locals will be employed as casuals, and other permanent consultancy and technical staff during the construction of the road. Civil and structural engineers, masons, carpenters, welders and other casuals will all gain employment during the construction phase of this road. These jobs are expected to improve the economy of the area and improve the livelihoods of the local people. This impact will be very high hence given a value of 4.

9.1.2 Gains in the local and national economy

Through the provision of employment to the locals, income from the salaries and wages will improve the economy of the town centres and the county at large. The contractor is also expected to purchase most of his materials from the project area and as such contribute positively to the local and national economy. The materials for construction will also be sourced from other areas within the nation hence positively affecting the national economy. This impact will be very high hence given a value of 4.

9.1.3 Transfer of skills

During construction of the road, many people from within and without the area will be employed to provide different services during road construction and maintenance. Local people will learn new skills from the civil engineers, welders, masons and other employees that come from outside. This impact will be moderate hence a value of 2.

9.1.4 Provision of market and supply for building materials

The contractors will purchase building materials such as wood, metals, sand, cement etc. from suppliers within or without the area. This impact will be moderate hence a value of 2.

9.1.5 Improvement of local and regional trade and business opportunities

The road will lead to the growth of local and regional trade. In the construction phase, building materials for road construction will be purchased both locally and regionally. Other small-scale business people such as food vendors, kiosk owners, hotels and lodgings will also benefit during the construction of the road. Livestock products will be transported efficiently from the project area to local and regional markets. This impact will be moderate hence value of 2.

9.1.6 Improved security

In the wake of insecurity incidences in the project area, the proposed road project will lead to an improvement of security. There will be a high deployment of police along the project area during the construction. Road patrols will be conducted frequently thereby improving the security of the area. This impact will be very high hence a value of 4.

9.1.7 Improved social infrastructure

Upgraded roads will be passable all weather. Some towns are cut off during rainy season and fewer motor vehicles along the road. Due to improved infrastructure many activities such as communication will improve automatically.

9.1.8 Interaction of people from different communities

The members of the public revealed that this project will promote national cohesion since people from different communities in Kenya will be working together during construction and operation phases of the project.

9.1.9 Growth of towns

The locals were confident that the road would lead to development of the existing towns and the formation of newer towns.

9.1.10 Corporate social responsibility (CSR)

The contractor will identify the needful areas in the project area and participate in CSR activities. Some of the noted problems in the area are: unavailability of water, poor education and health infrastructure, employment, among others. Therefore, the contractor is expected to assist in any of these areas as part of CSR. Further, material sites such as borrow pits may serve as water collection

points. As part of corporate social responsibility, the contractor will construct additional water points such as earth pans, boreholes amongst others. These water points will also ecologically benefit the wildlife in the locality. This impact will be high hence a value of 4.

9.2 Negative environmental and social impacts during construction phase

The likely negative environmental and social impacts during the construction phase of the project are:

9.2.1 Noise pollution and excessive vibrations

Because of excavation, crushing, construction and demolition works, there will be high noise and vibration levels in the project area. Noise and vibrations will emanate from transportation vehicles, construction machinery, metal grinding and cutting equipment, and among others. Excavation works will also cause vibration and noise. Quarries and borrow pits that will be used for sourcing of road construction material will also result to noise emissions. However, the proponent is expected to take appropriate steps to minimize noise pollution through provision of appropriate personal protective equipment to construction workers, minimizing the frequency of transport of construction materials and ensuring that all construction machinery is well maintained, all quarries and borrow pits will be subjected to independent Environmental Impact Assessment (EIA) studies. This impact will be moderate hence value of 2.

9.2.2 Air pollution due to dust and exhaust emissions

In the construction phase, the excavations, demolitions, and transportation of building materials will result in the emissions of large amounts of dust within the project site and surrounding areas. Asphalt, concrete and batching plants are also possible sources of dust and air pollution within the project area. The diversion of traffic in the construction phase will also contribute to dust emissions. The contractor is expected to conduct separate EIAs for the batching plants and monitor the dust levels periodically as stipulated in the Environmental Monitoring Plan, he will also minimise this through sprinkling water on daily basis on the areas that transport trucks use, excavated areas and the diversion routes. This impact will be moderate hence value of 2.

9.2.3 Increased generation of solid waste

Volumes of solid wastes will be produced during the different phases of the project development. Solid waste materials will be generated during demolition works as well as from various packaging materials. Significant quantities of rock and soil materials will be generated from earth moving during construction activities. Solid waste generation during operation and maintenance activities will include road resurfacing waste (e.g. removal of the old road surface material), road litter, illegally dumped waste, or general solid waste from campsites; vegetation waste from the clearance of road reserves; and sediment and sludge from storm-water drainage system. Paint waste may also be generated from road and bridge maintenance (e.g. due to removal of old paint from road stripping and bridges prior to re-painting). The contractor would need to ensure that all solid wastes are collected and disposed appropriately to promote a clean and healthy environment along the transport corridor, a storm-water management plan that has been provided in this report should be adhered to. The contractor shall comply with recommendations of solid waste management provided in the ESMP. This impact will be moderate hence a value of 2.

9.2.4 Increased energy consumption

The construction of the proposed road is expected to lead to an increase in traffic between Baragoi and North Horr. It is thus expected that this will lead to increased consumption of fossil fuel particularly petrol and diesel. There will be high consumption of fossil fuels due to the high number of construction machinery and trucks in the project. At construction, wood may be consumed in the melting of bituminous products. Workers at campsites might also do tree logging to produce charcoal for their cooking and heating needs at the campsite. This impact will be moderate (value of 2) in view of the measures that will be put in place to reduce consumption of fossil fuels.

9.2.5 Discharge of wastewater, sewage and degradation of water quality

It is expected increase in the generation of wastewater and sewage during the construction phase of the project. The increases will take place at construction camp sites and in various towns located along the road. There will be impact due to oil spillage, disposal practices of used oil, oil filters during the construction of the project. This impact will be moderate hence a value of 2.

9.2.6 Water abstraction and consumption

During the construction of the road, there will be increased abstraction of water from Lake Turkana, seasonal streams, shallow wells and from groundwater resources This may reduce the flow of the few available streams in an area which is generally arid and semi-arid. This may further reduce availability of water to the local communities including possibility of degrading aquatic ecosystems due to reduction in base flows. This impact will be moderate hence a value of 2.

9.2.7 Modification of hydrology

The increased water abstraction from rivers, laggas and Lake Turkana may modify the hydrological characteristics of these water bodies. Also, quarries and pits for extraction of road construction materials (ballast, soil, etc.) may provide localized areas for surface water infiltration with the possibility of recharging groundwater aquifers. However, water collecting in such open pits may also provide a large surface for the evaporation of water. Surface runoff may also accumulate along the sides of the highway preventing direct flow to river channels. This impact will be low hence a value of 1.

9.2.8 Generation of storm water and impact on drainage

Construction or widening of sealed roads increases the amount of impermeable surface area, which increases the rate of surface water runoff. There will be increased generation of surface runoff on the road. The increased or excess runoff could overwhelm local drainage system including streams with potential for increasing downstream flooding hence damage to property. Flooding downstream can also become a health hazard (e.g. breeding ground for mosquitos, etc.). Good drainage design and construction in the development of roads is critical to the success of road construction. This impact will be moderate hence a value of 2.

9.2.9 Increased soil erosion risk and soil quality degradation

Proposed road construction will involve creation of a large impervious surface that restricts the infiltration of rainwater. This leads to high generation of surface runoff that flows on the sides of the road in drainage ditches. Where the surface runoff is channeled directly to bare steep slopes with

loose soil, it can lead to serious soil erosion problems. This can affects the stability of the road plus associated facilities such as bridges, drifts and culverts. Sediment and erosion from construction activities and storm water runoff may also increase turbidity of surface waters. This impact will be moderate (value of 2).

9.2.10 Loss of vegetation cover and biodiversity

During the construction phase of the project, there will be clearance of vegetation along the corridor to pave way for the proposed road. The project area has scarce vegetation and therefore there will be minimal clearance of vegetation. It is expected that the project will require huge quantities of materials such as ballast, murram, stones, conglomerates, sand, gravel, and soil, among others. In addition, the contractors will install several material camp sites as well as a batching plant that will impacts on the environment, especially with smothering vegetation species around the camp sites.

The proponent is going to ensure that campsites and quarries are constructed in areas that are not high in vegetation density. Due to the need to clear vegetation existing for quarries and building of campsites. All borrow pits and quarries will need to undergo a separate Environmental and Impact Assessment Study so as to ensure there will be no major negative impacts from them. This impact will be moderate hence value of 2.

9.2.11 Disruption and loss of businesses

During the field survey, we noted that some small-scale businesses and temporary structures may be affected in towns and market centres. They might be displaced to pave way for construction of the proposed road project. Like in South Horr, Loiyangalani, Gas and North Horr some hotels and food vendors operating businesses expressed concern that there would be loss of livelihood. However due to the anticipated resettlement action plan (RAP), this impact will be low hence a value of 1.

9.2.12 Spread of STD, HIV and AIDS

Consultants and residents expressed concern that there would be an increase in incidences of sexually transmitted diseases including HIV and AIDS especially during construction of the road because of increased prostitution. The project proponent will need to work jointly with appropriate county and national government health agencies to come with a comprehensive STD, HIV and AIDs control programme during the construction and operational phases of the project. This impact will be moderate hence a value of 2.

9.2.13 Gender Based Violence

Due to inequalities between genders as a result of employment from the road works, it is anticipated that cases of gender based violence might occur. This will be compounded by issues such as compensation for land acquisition, regular source of income, growth of businesses and among others. Though men are victims of gender based violence, women are more prone and vulnerable to experience it. This impact will be moderate hence a value of 2.

9.2.14 Interference of existing development infrastructure

During the field survey, it was noted that the proposed project would interfere with other infrastructural public utilities already existing along the proposed road such as water pipelines (South Horr and Loiyamgalani) and power lines (North Horr). These lines may have to be relocated during the construction of the road. This impact will be moderate hence a value of 2.

9.2.15 Insecurity

There were concerns that due to an influx of people as construction workers at the project, insecurity is likely to increase. There will be increased risk of poaching of wild animals like Ostrich, dikdiks and gazelles. Also, construction workers may be attacked by wild animals like hyenas and foxes which are prone in areas where the proposed road passes. This impact will however be low hence a value of 1.

9.2.16 Cultural changes

The road traverses land inhabited by many tribes who are mainly Muslims and Christians. The upgrading of the road is likely to increase the attractiveness of the area, which may result in the following.

- Increase in undesirable sexual and social interaction in the area;
- Degradation of the cultural values and norms in the area;
- Increase in the levels of crime in the area.

9.2.17 Delays in transportation

During construction phase, the road traffic will be controlled and, in some cases, complete road closure will be necessary especially at laggas and river crossings. This will entail disruption to traffic flows resulting in delay to transport of people and goods. There will be also delays caused by diversion during construction. This impact will however be low hence a value of 1 due to the current low traffic in the region and mitigation measures to be put in place.

9.2.18 Gender and equality biases

Always Gender and equality biases in road projects may be to the basis of differential treatment of persons based on their sex roles, ethnicity, status, religion, race, age, beliefs and disability among other attributes. The Contractor and proponent should put measures in place to address issues of gender equality and freedom from discrimination among all Kenyans that will be involved in the project with a focus on Special Interest Groups, namely; women youth, children, persons with disabilities (PWDs), the elderly and minority and marginalized groups and communities. The proponent is expected to roll out programs and activities in various sectors including health, education, housing, employment and social support and justice among others. The overall goal will be the reduction of gender inequalities and the discrimination against all interest groups during the project cycle. Therefore, this impact will be low hence a value of 1.

9.2.19 Occupational safety and health

The Occupational safety and health issues associated with the construction and operation of the proposed road will include; physical hazards, chemical hazards and noise hazards. Chemical hazards in road construction, operations, and maintenance activities will principally be associated

with exposures to road construction materials, dust during construction; exhaust emissions from heavy equipment and motor vehicles during all construction activities.

Road construction and maintenance personnel can be exposed to a variety of physical hazards from operating machinery and moving vehicles but also working at elevation on bridges and overpasses. However, other physical hazards include exposure to weather elements (heat), noise, work in confined spaces, trenching, overhead power lines contact, falls from machinery or structures, and risk of falling objects. There is also a possibility of accidents when transporting workers to the construction sites. This impact will however be low hence a value of 2.

9.2.20 Community health and safety

Community health and safety issues will emerge during construction and operation of the road. The impacts will include dust, noise, and vibration from construction vehicle movements and communicable diseases associated with the influx of temporary construction labor. Significant community health and safety issues associated with the proposed road project will include pedestrian safety, traffic safety, and emergency preparedness.

Non Motorist Transport (NMT) which includes cyclists, pedestrians, hand and animals carts are at the greatest risk of serious injury from collisions with moving vehicles. Children will generally be the most vulnerable due to lack of experience and knowledge of traffic related hazards, their behavior while at play, and their small size making them less visible to motorists.

Accidents can involve a single or multiple vehicles, pedestrians or motor cyclists and animals. Many factors contribute to traffic accidents. Some are associated with the behavior of the driver or the quality of the vehicle, while others are linked to the road design, or construction and maintenance issues. Emergency situations most commonly associated with road operations include accidents involving single or multiple vehicles, pedestrians, and/or the release of oil or hazardous materials.

The night glare from vehicles will cause disturbances to local communities at night and interfere with their comfortable sleep. This problem is likely to be greater in the future as vehicular traffic is set to increase several folds. Mitigation measures will however be put in place to prevent further direct, indirect or cumulative adverse effects. The impact scale is considered high hence a value of 3.

9.2.21 Disturbance to Wildlife

The project area has Ostrich, dikdiks, gazelles, gerenuks, snakes and among other wildlife that roam freely. The public raised a concern that the wildlife will be disturbed considering they will not have freedom of movement from one side to the other side of the road since they will only be forced to use the underpasses. The influx of many people working at the project may also cause change in animal behaviour. Reduced movement of wild animals may lead to concentration in certain areas leading to overgrazing, damage to natural vegetation and general loss of ecological integrity of the ASAL ecosystem along the road. There would also be visual and auditory disturbance due to the presence of machinery, construction workers, and associated equipment. This impact will be moderate hence value. The contractor is expected to fence all the borrow pits and boreholes in order to avoid wildlife accidents. This impact will be low hence value 1.

9.2.22 Increased loss of human and animal life due to road accidents

Since the area is inhabited by pastoralists, livestock grazing along the proposed road stretch could lead to accidents. Further the new road is likely to lead to over-speeding of vehicles hence a likelihood of people being knocked down and mostly at major town centers. This impact will be low hence value 1.

9.2.23 Reduced accessibility of neighbourhood areas

During construction, there is a likelihood is reduced accessibility of neighbourhood areas, grazing points or villages because of construction trenches and soil stalking. This impact will be low hence value 2.

9.2.24 Community conflicts

Due to the multi-ethnic relations in the region, there is a likelihood of community conflicts attributed to cultural issues and historical relations. The community are likely to raise grievances based on geographical boundaries, location of social amenities and employment opportunities. This impact will be low hence value 2.

9.2.25 Sexual Exploitation/Child Abuse

As a result of land and property compensation plus influx of workers into the area due to the road construction, it is anticipated that there will be a lot of money in circulation and this may lead to the sexual abuse of young children by the workers for exchange of money, food or other basics of life. Other forms of child abuse might be the employment of minors for labour at the construction site. This impact will be low hence value 1.

9.2.26 Cumulative Impacts

Cumulative impacts are impacts which result from the incremental impact of a proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. As such, cumulative impacts such as impacts on resources such as water, energy and road construction materials within the region might arise due to the needs for the construction of the road, impacts on vegetation due to an increase of vehicular traffic and people within the region. Proposed project can also contribute to potential community impacts identified for the project, such as changes in community character, traffic patterns, housing availability, and employment.

9.3 Positive environmental and social impacts during operation phase

The following were the positive environmental and social impacts for the proposed Baragoi – North Horr road project during the operation phase:

9.3.1 Creation of employment opportunities

Both direct and indirect employment opportunities will emerge during the operation phase. For the direct employment, people will be employed for the normal and continuous road maintenance whereas for the indirect employment, vehicular traffic will increase hence providing employment to the drivers and turn boys. Road side businesses will also grow ranging from small shops to big petroleum filling stations and garages along the road. This will in turn create indirect employment opportunities to the locals.

9.3.2 Improved local socio-economy

Respondents who were interviewed acknowledged that the proposed road will contribute immensely to the development of business at the trading centres along the road and the following socio-economic benefits:

- Increased business opportunities at the market centres due to the presence of the increased vehicular traffic along the route for instance petrol filling station, garages, shops etc.,
- Employment of local workers during the operation phase of the project;
- Strengthening of local economy through the establishment of micro-enterprises such as foodstuff sale points.

The implementation of the project will result in the improvement of the living conditions of population living along the road thus contributing to poverty reduction.

9.3.3 Increased security

The area where the road traverses has over the years been known for insecurity and cattle rustling. The road will make it easier for road patrols and security operations to be conducted in the area. Additionally, the road will lead to an improvement in the communication infrastructure as such making it easy for the relaying of intelligence reports.

9.3.4 Faster means of transport and Cheap / affordable fares

The community were positive that the proposed road project will provide a faster and cheaper means of transport for trucks, passengers and personal cars, between the two counties. This will considerably reduce additional travelling and transportation costs being incurred currently and improve the current transport situation along the road. During rainy seasons the road is rendered impassable hence tarmacking will solve this problem. Coming with the project are bridges, drifts and culverts which shall be constructed to enhance transportation.

9.3.5 Gain to the county and national economy through transportation

The main mode of transportation in the area is road transport. There are no other affordable options for transport in the project area. Generally, the project road plays an important role in the area by transportation of passengers to the various town centres along the project road.

With improved road conditions, it is expected that there will be improved transport within the region. This is likely to benefit the local and regional economy in the short term and the national economy in the long term. There will also be easier access to the essential services offered in the neighbouring Counties.

9.3.6 Revitalization of large scale agriculture in the area

The project area is rangeland occupied by pastoralist and fishermen communities. The farmers are largely livestock keepers and fishermen and are the leads in the supply of livestock products in the country. However, the up-scaling and growth of this farming has been hindered by the poor transportation network in the region. Therefore, construction of the proposed road project in the area will offer numerous opportunities for farmers to upgrade their business and hence lead to the improvement of agriculture. There also exists an export business for fish and honey.

9.3.7 Reduction in particulate matter emissions (dust)

The current carriage way is made of earthen material. Dust is a major concern as vehicles plying the route makes the area along the road quite dusty. Considering the locality is in an arid area, the received rainfall is low, meaning that hot, dry and dusty conditions prevail. Paving of the road surface with bitumen will eliminate dusty conditions experienced by users and villages located along the proposed road project.

9.3.8 Improved road safety

Road projects can lead to reduction in accidents when they involve significant improvements in vertical and horizontal alignments, improved carriageway width, junction layout or greater separation of pedestrians, non-motorized traffic and motor vehicles. The improvement of the project road may lead to significantly increased running speeds; the standard speed of the road will be 80 Km/hr - 100 Km/hr and is likely to induce significant generation of fast-moving traffic. This will shorten the travelling time and transportation cost.

The proposed project design will contribute to improving road safety and the comfort of road users in several ways such as:

- Sight distance and visibility especially at approaches to bridges will be improved;
- Road signs (both warning and directional) and road markings will be included in the design;
- Adequate shoulders will be designed throughout its road corridor.

9.4 Negative environmental and social impacts during operation phase

9.4.1 Noise pollution and excessive vibrations

The public also feared that there would be noise during operation stage of the project due to high speed and revving of motor vehicles along the road since its design speed is 80-100km/hr. However, this impact will be moderate hence a value of 2.

9.4.2 Air pollution due to dust generation and air emissions

Traffic movement between Samburu and Marsabit counties and beyond will lead to the release of dust and smoke from the moving vehicles. Exhaust emissions are likely emitted pollutants which can cause significant air quality impact. Such emissions can be enormous and may affect a wider geographical area depending on increase in traffic. This impact is however moderate for proposed road project hence a value of 2.

9.4.3 Impacts on livestock and wildlife breeding points

Livestock and wildlife crossing the road in search of pasture may be hindered once the road becomes operational making access to pasture, water and breeding grounds difficult. Further both livestock and wildlife are likely to become prone to accidents from moving vehicles. This impact will be moderate in view of the measures that will be put in place, hence a value of 2.

9.4.4 Increased consumption of fossil fuel

The construction of the proposed road project is expected to lead to an increase in traffic movement between Samburu and Marsabit counties and beyond. Also, most of the traffic will be flowing faster.

It is thus expected that this will lead to increased consumption of fossil fuel particularly petrol and diesel. It is also expected that there will be high consumption of fossil fuels due to high number of construction machinery and trucks that will be deployed in the project. This impact will be moderate in view of the measures that will be put in place to reduce consumption of fossil fuels, hence a value of 2.

9.4.5 Storm water and impact on drainage

Construction of sealed roads (tarmacked road) increases the amount of impermeable surface area, which increases the rate of surface water runoff flow. The project will also impact on the drainage during the operational phase of the road. There will be increased generation of surface runoff on the road. The increased or excess runoff could overwhelm local drainage system including streams with potential for increasing downstream flooding, and damage to properties. Good drainage design and construction in the development of roads is critical to the success of road construction. Also, storm water generated on the road may be contaminated with oil and grease, metals (e.g. lead, zinc, copper, cadmium, chromium, and nickel), particulate matter and other pollutants released by vehicles on the road. The storm-water management plan specified in this report should be observed. This impact will be high hence a value of 3.

9.4.6 Loss of human life and livestock due to road accidents

With the tarmacking of the road, vehicles will be travelling at a design speed of 80-100km/h. Being a pastoralists zone, livestock cross the road for pasture and water. The availability of wildlife like elephants, giraffes, dikdiks, ostriches, gazelles and hyenas along the project road may lead to increased accidents. Considering the above-mentioned speed, there is a likelihood of possible human accidents along the road, and especially near villages. Road bumps, rumble strips and signage need to be provided throughout the road length and especially in towns and villages such as South Horr, Loiyangalani, Gas, North Horr to reduce these incidences. This impact will be moderate hence a value of 2.

9.4.7 Increased risk to community health and safety

Community health and safety issues will emerge during the operation of the road. The impacts will include dust, noise, and vibration from vehicles in transit. Significant community health and safety issues associated with the proposed road project will include pedestrian safety, traffic safety, and emergency preparedness.

Pedestrians and motor cyclists are at greatest risk of serious injury from collisions with moving vehicles. Collisions and accidents can involve a single or multiple vehicles, pedestrians or motor cyclists and animals. Emergency situations most commonly associated with road operations include accidents involving single or multiple vehicles, pedestrians, and/or the release of oil or hazardous materials. The night glare from vehicles will cause disturbances to local communities at night and interfere with their sleep. This problem is likely to be greater in the future as vehicular traffic is set to increase several folds. The impact scale is however considered to be moderate hence a value of 2.

9.4.8 Generation of solid waste

Solid waste generation during operation and maintenance activities will include earthen materials, road litter, illegally dumped waste, or general solid waste from villages; vegetation waste from the clearance of road reserves; and sediment and sludge from storm water drainage system. The

proponent would need to ensure that all solid wastes are collected and disposed appropriately to promote a clean and healthy environment along the road. This impact will be minimal hence value of 1.

9.4.9 Soil quality degradation due to oil spills

The increase in the fuel stations due to the increase in the traffic, oil residuals from fuel service stations, motor garage yards, solid waste dumping and roadside truck parking are anticipated to impact the soil quality. The impact on soil quality from these activities will be cumulative hence affect ground and surface waters. The impacts will be significant in towns along the road. This impact will be moderate hence a value of 2.

9.4.10 Sexual Exploitation/Child Abuse

Many cases of child abuse and sexual exploitation have been reported at areas along roads where commercial transit vehicles operate. With the completion of the road, it is expected that the traffic of heavy commercial vehicles will increase along the route. As a result, it is anticipated that the impact of sexual exploitation and child abuse will occur.

9.4.11 Cumulative Impacts

In the operational phase of the project, some of the cumulative impacts that might arise include disturbance of vegetation and soil as a result of growth in transport and tourism activities it is expected motorists stop indiscriminately hence roadside vegetation is damaged by vehicle and foot traffic, and the soil is left unprotected, influx of people due to the opening up of the entire region, proliferation of terrorism activities for example.

9.5 Positive impacts during decommissioning phase

Due to the national significance of this project, the likelihood of decommissioning is minimal, therefore impacts discussed below are almost unlikely

9.5.1 Rehabilitation and restoration of the site to its original status

During the decommissioning of the project the area will be rehabilitated to its original status by revegetating areas where vegetation is cleared, making sure that water ways are cleared to facilitate drainage for example.

9.5.2 Employment opportunities

In the event of decommissioning locals will gain employment from the various jobs that will arise.

9.5.3 Reduced environmental pollution

Motor vehicles emit air, soil and water polluting substances. In the event of road decommissioning, the traffic in the area will reduce and hence considerably reducing environmental pollution.

9.5.4 Reduced negative environmental impacts of operation

At the operation phase of the project many negative environmental impacts will arise. Such impacts include; disturbance of wildlife, noise pollution, water pollution, road accidents etc. All these impacts will subsequently reduce when the project is decommissioned.

9.6 Negative impacts during decommissioning phase

9.6.1 Solid waste generation

A lot of solid waste such as tarmac waste, cement waste, and among other wastes will be generated during decommissioning of the project.

9.6.2 Noise and vibration

There will be noise and vibration from vehicles and machines that will be used during the decommissioning phase.

9.6.3 Dust emission

Dust will be emitted by moving vehicles and from the decommissioning works through digging and excavating of the tarmac surface.

9.6.4 Reduced/ loss of positive impacts to the project

During decommissioning people will lose employment. Drivers, conductors and turn-boys and other bus operators will be affected because of the decommissioning. Other positive impacts that will be accrued during the operation phase like fast movement of goods and services, cheaper transportation etc. will also be reduced.

10. MITIGATION MEASURES AND MONITORING PROGRAMMES

The construction of the proposed Baragoi – North Horr road will have a wide range of impacts on the biophysical environment, health and safety of employees and members of the public, and socioeconomic well-being of the local communities and households. It is usually impossible to mitigate all the expected negative environmental and social impacts. Thus, in this chapter, an attempt was made to formulate mitigation measures for the most significant negative environmental and socio-economic impacts. The aim is to ensure that the most significant negative impacts are minimized as much as possible while maximizing on the positive benefits of the project. The mitigation measures will be presented in the environmental management and monitoring plan that is intended to assist the proponent in the management of the adverse environmental impacts associated with the life cycle of the project.

10.1 Mitigation measures during the construction phase of the proposed Baragoi – North Horr road project

The following section provides a discussion on the mitigation measures that will be undertaken during construction of the project. It is important to note that a special focus has been given to the negative impacts that are considered significant and that warrant intervention to reduce the level of impact to the local communities and the environment.

10.1.1 Mitigating noise pollution and excessive vibrations

Noise pollution and excessive vibrations should be mitigated as follows:

- Undertake loud noise and vibration level activities during off-peak hours during the day (i.e. between 8.00 am and 5.00 pm);
- Blasting activities along the road corridor and associated quarries should be done during the day and the public should be properly informed of the activity in time.
- Ensure that all vehicles and construction machinery are kept in good condition all the time to avoid excessive noise generation;
- Sensitize drivers of construction vehicles and machinery operators to switch off engines or machinery that are not being used;
- Acquire Noise and Excessive Vibrations Pollution Control Permit and comply with conditions provided by the Environment Management and Coordination, Noise and Excessive Vibrations Pollution Control Regulations 2009;
- Ensure that all workers wear ear muffs and other personal protective gear/equipment when working in noisy sections;
- Support facilities such as hard rock quarries should adopt controlled blasting techniques, preventing flying rock debris and high intensity vibrations. The management should equally observe relevant explosives use and blasting permits provided by the Inspector of Mines and Geology.

10.1.2 Mitigating air pollution due to dust generation and air emissions

This negative impact of dust should be mitigated as follows:

- Covering heaps and berms of soil;
- Erection of dust screens around buildings under construction especially at the workers' camps. Dust control measures should be adopted at concrete batching plants, providing

adequate PPE to staffs, canopying loading points and erecting dust screens around the plant;

- Adhere to the Environmental Management and Co-ordination (Air Quality) Regulations, 2014;
- Enforce onsite speed limit regulations;
- Re-vegetating exposed areas during the operation phase of the project;
- Sprinkling water along the diversion routes or earth along the road section.
- Slowing the speed of traffic by using bumps and/ or clearly marked road signs may contribute to reducing dust levels;
- Haulage routes will need to be identified and maintained by watering to minimize the impact of dust;
- Collecting storm water and use to de-dust the construction site and the all-weather access roads if volumes stored are sufficient;
- Sprinkling of water on dry and dusty surfaces regularly at the diversion tracks;
- Add suitable soil stabilizers on access roads or pave access roads to control dust;
- Dust control mechanisms at the gravel borrow sites through extraction in wet conditions and transport in covered trucks;
- Implement dust control measures at the quarry sites and aggregate crushing sites.

To mitigate exhaust emissions, it will be mandatory to:

- Ensure machines and vehicles are properly and regularly maintained.
- Control the speed of the traffic movement by through adequate policing and monitoring.
- Adhere to the EMCA, Fossil Fuel Emission Control Regulations 2006.
- Discourage plant operators and drivers of construction vehicles from unnecessary revving and idling.
- Sensitize construction drivers and machinery operators to switch off engines when not being used.
- Limit construction traffic movement and operations to the most necessary activities through adequate planning.
- Procure machines, equipment and vehicles which are environmental friendly.
- Ensuring that the construction machines, equipment and vehicles have the requisite inspection certificate.

10.1.3 Minimizing generation of solid waste

All storage and construction sites are to be kept clean, neat and always tidy. No burying or dumping of any waste materials, metallic waste, litter or refuse shall be permitted. The Contractor must adhere to Environmental Management and Co- ordination (Waste Management) Regulations 2006. The Contractor shall implement measures to minimize waste and develop a waste management plan to include the following: -

- Composting of vegetation waste for reuse as a landscaping fertilizer;
- Managing sediment and sludge removed from storm drainage systems maintenance activities as a hazardous or non-hazardous waste based on an assessment of its characteristics.
- Incorporating recyclable materials (e.g. glass, scrap tires, certain types of slag and ashes) to reduce the volume and cost of new asphalt and concrete mixes.

- Collecting road litter or illegally dumped waste and managing it according to the recommendations in the General EHS Guidelines and Waste Management Regulations, 2006.
- Maximizing the rate of recycling of road resurfacing waste either in the aggregate (e.g. reclaimed asphalt pavement or reclaimed concrete material) or as a base;
- Provision of bottle and can trash disposal receptacles at parking lots to avoid littering along the road.
- Obsolete products should be managed as a hazardous waste as described in the General EHS Guidelines.
- Comply with provisions of the EMCA, Waste Management Regulations 2006.
- Collecting animal carcasses in a timely manner and disposing them through prompt burial or other environmentally safe methods.
- Management of all removed paint materials suspected or confirmed of containing lead as a hazardous waste.
- Drainage outfalls should be properly constructed to reduce the erosion from surface runoff and storm water.
- Grinding of removed, old road surface material and re-use in paving, or stockpiling the reclaim for road bed or other uses. Old, removed asphalt may contain tar and polycyclic aromatic hydrocarbons and may require management as a hazardous waste.
- Develop and implement a Construction Waste Management Plan before start of the project.
- Sub-contract a licensed waste handling firm to collect solid wastes on regular basis and dispose off in approved dumping sites.

10.1.4 Minimizing energy consumption

This should be mitigated as follows:

- Ensure construction machinery and trucks are well maintained;
- Install automatic control street lights with Light Dependent Resistor (LDR) sensors;
- Ensure maximum use of wind power along the project road;
- Switch off lights when not in use;
- Install electricity meters to monitor the consumption of electricity in workers camps;
- project;
- Use energy-efficient construction machinery and trucks during construction phase of the Promote the use of solar energy and energy efficient bulbs in workers base camps and for street lights in towns and villages situated along the road;
- Carry out Energy Audits for evaluation and improvement of energy consumption and saving practices adopted by all parties involved;
- Ensure compliance with Energy Management Regulations of 2012.

10.1.5 Mitigating discharge of wastewater, sewage and degradation of water quality

The contractor should develop appropriate measures to ensure all waste water is treated, handled and disposed appropriately to avoid contamination of water bodies (both open and underground), soils and farm lands. Measures like development of garages for repairs, management of waste oil, development of car washing facilities, oil spills management among others should be incorporated in the project.

No grey water runoff or uncontrolled discharges from any site or working areas (including wash-down areas) to adjacent watercourses and/or water bodies shall be permitted.

This should be mitigated as follows

- Comply with the EMCA Waste Management and Water Quality Regulations 2006.
- Potential pollutants of any kind and in any form, shall be kept, stored and used in such a manner that any escape can be contained and the water table not endangered;
- Install meters in workers' camps to control and monitor consumption rates of water.
- Ensure regular maintenance of plumbing systems and septic tanks to avoid spillage of raw sewage.
- Promote recycling of wastewater and storm water.
- Water containing pollutants such as cements, concrete, lime, chemicals and fuels shall be discharged into a conservancy tank for removal from site. This particularly applies to water emanating from concrete batching plants and concrete swills;
- The Contractor shall also prevent runoff loaded with sediment and other suspended materials from the site/working areas from discharging to adjacent watercourses and/or water bodies; This can be done by use of sediment traps and use of drainage to control the flow and velocity of the runoff

10.1.6 Minimizing water abstraction and consumption

This should be mitigated as follows:

- Install water conserving automatic taps and toilets in the various workers' camps;
- Install gutters on the roof of the workers' camps to harvest rain water;
- Construct underground reservoir for storage of harvested rain water;
- Drilling of boreholes along the road corridor for use to reduce over reliance on water from existing laggas and springs. The boreholes will also support the locals after the road construction;
- Harvest surface runoff in check dams and borrow pits for use to suppress dust;
- The Contractor must adhere to water quality regulations described in Legal Notice No. 120 of the Kenya Gazette Supplement No. 68 of September 2006 and Water Act 2016.

10.1.7 Modification of hydrology of ASALs

This could be mitigated as follows:

- Control excessive abstraction of water from laggas, water pans, Lake Turkana and boreholes;
- Provide diversion channels for rivers to avoid complete blockage during construction of bridges and culverts;
- Re-open all blocked river channels after construction of bridges/culverts;
- Quarries and pits for extraction of road construction materials to be used as water harvesting sites after reclamation;
- Surface runoff on the sides of the road should be channelled to areas with gentle slopes to avoid excessive erosion of the road slopes;
- Construct over passes and bridges in areas occupied by rivers and wetlands.

10.1.8 Minimizing generation and movement of storm water and impact on drainage

This should be mitigated through the following:

- Use of vegetated swales (planted with salt-resistant vegetation); filter strips; terracing; check dams; detention ponds or basins; infiltration trenches; and infiltration basins.
- Paving in dry weather to minimize runoff of asphalt or cement materials.
- Use of storm water management practices that slow peak runoff flow, reduce sediment load, and increase infiltration.
- Regular inspection and maintenance of permanent erosion and runoff control features.

10.1.9 Minimizing increased soil erosion risk and soil quality degradation

There are several activities that would bring about soil loss and erosion as mentioned above. To address soil conservation during construction and operation, phases, mitigation measures have been addressed as follows: -

- **Rehabilitation of borrow areas:** During quarrying and other works involving removal of top soil, each layer not required should be stockpiled separately for re-use to reinstate quarries and other material sources after exhaustion. Towards mitigation of craters left behind after material extraction, all land acquired for material extraction will be backfilled and re-instated. Where the top soil does not fill the pit, water draining tunnels will be constructed to prevent /minimize stagnation of water. Further, in consultation with the residents, such quarries could be converted into pans for purposes of storing runoff for livestock watering. This will greatly improve access to water more so, during dry seasons.
- **Cut and fill areas:** Road design activities should aim at balancing and fill activities to reduce the net quantities of soil either for disposal or borrowing. All cut, and fill sites will be replanted with sod grass to complete cover while the edge of the road reserve will be marked with a row of locally adapted tree species.
- **Project will avoid opening new materials borrow sites:** In as much as possible, hard rock will be sourced from existing quarries if any. However, there may be need to open up new quarries in some areas. Such opening will be followed by rehabilitation of the quarry site prior to closure of the contract. An Environmental Management and social Plan is expected to be developed and cleared for each of the material site opened under the project.

The consultant advised that:

Rehabilitation of all quarry spoils and efficient sourcing and use of raw materials must be reached. The contractor/ proponent will source building materials such as gravel, sand, ballast and hard core at the project locality. Consultation will be held with the county Government, Community members and their representatives on the best sites to source materials and rehabilitation measures will be agreed. Sites to be selected should have minimum negative impacts on access to water points and agricultural areas.

Environmental Impact Assessment and monitoring should be conducted for such activities or in consultation with County Director to ensure environmental conservation and rehabilitation after use. The contractor should ensure application of acceptable environmental performance standards and that the negative impacts of their activities at the extraction sites are considerably well mitigated.

To reduce the negative impacts on availability and to ensure sustainability of the materials, the contractor/ proponent should only extract what will be required through accurate budgeting and estimation of actual construction requirements. This shall ensure that materials are not extracted or purchased in excessive quantities. Moreover, the proponent will ensure that wastage, damage or loss (through run-off, wind, etc.) of materials at the construction site is minimal, as these would lead to additional demand for and extraction or purchase of the materials.

In addition to the above measures, the proponent should consider reuse of excavated materials and use of recycled materials. This will lead to reduction in the amount of raw materials extracted from natural resources as well as reducing impacts at the extraction sites. All exhausted quarries and borrow pits should be isolated, protected and rehabilitated to usable state before the contract closure.

10.1.10 Minimizing loss of vegetation cover and biodiversity

This should be mitigated as follows:

- The contractor is expected to comply with the National Sand Harvesting Guidelines provided by NEMA and the County Governments.
- Provide adequate protection against scour and erosion; and consider the onset of the rainy season with respect to construction schedules.
- Employ vegetation rehabilitation techniques to recover lost plant cover such as Reforestation and Afforestation.
- Minimize clearing of indigenous plant species and replanting of indigenous plant species in disturbed areas.
- Separate EIAs should be conducted for camps, borrow pits, quarries, boreholes and sand pans.
- Design and construction of wildlife access such as culverts to avoid or minimize habitat fragmentation.
- Minimize clearing and disruption of riparian vegetation.
- Explore opportunities for habitat enhancement through such practices as placement of nesting boxes in rights of-way, bat boxes underneath bridges, and reduced clearance to conserve or restore native species.

10.1.11 Mitigating disruption and loss of businesses in the town centres traversed by the road

This should be mitigated as follows:

- Provision of subsistence or transitional allowance to squatters;
- Provision of employment in the project for the squatters where possible;
- Provide support to squatters to establish small-scale businesses in other suitable locations in affected town;
- Promote other sources of livelihood among the local communities;
- Educate squatters on the need to maintain free road reserve;
- Provide comprehensive health and safety education to squatters in affected town;
- Put in place a grievance redress mechanism as discussed in chapter 10 of this report.

10.1.12 Minimizing the spread of STD, HIV and AIDS

This should be mitigated as follows:

- Develop a comprehensive STDS, HIV and AIDs awareness and control programmes such as provision of condoms to workers both male and female;
- Provision of STDs, HIV and AIDS prevention measures to workers;
- Creation of awareness of STDs, HIV/AIDS in workers camps through trainings and installation of posters;
- Adhere to and implement the Sexual Offences Act, 2006 and its amendment 2012.

10.1.13 Minimizing Gender Based Violence

This should be mitigated as follows:

- Financial management training should be conducted to the PAPs and the employees;
- Have separate latrines for different genders;
- Provide a communication line to report such cases.

10.1.14 Minimizing interference of existing development infrastructure

This should be mitigated as follows;

- Relocate all facilities affected in consultations with various parties affected with respect to water, sewerage, pipelines, and electricity;
- Involvement and continuous consultation of key stakeholders and community members with respect to water, pipelines, and electricity at all stages of the project cycle;
- Compensation and re-locations;
- Use of an integrated approach in planning public utilities by sharing most transport corridors for roads, water, sewerage, electricity lines, etc.

10.1.15 Minimizing security risk

This should be mitigated as follows:

- Thoroughly screen workers, suppliers and distributors;
- Ensure 24-hour surveillance by engaging the Administration Police and Home guards services during the day and night;
- Install CCTV cameras in strategic locations in workers' camps;
- Ensure close liaison with the local Police Department;
- Ensure all communities are given chances of employment during construction;
- Avoid the disposition of meat waste and animal carcasses near the campsites and villages.

10.1.16 Minimizing cultural changes

The following measures will be implemented by the proponent to reduce cultural erosion / changes;

- Consult with the affected Communities to identify cultural heritage of importance, and to incorporate into the client's decision-making process the views of the affected Communities on such cultural heritage;
- Provide community awareness programmes;

- Develop programmes to enhance cohesion between project employees and the local community.

10.1.17 Minimizing delays in transportation

To reduce delays in transportation, the following will be adapted;

- Traffic circulation changes will be made as per the Traffic Act Cap 403;
- Long traffic diversion roads shall be avoided;
- Advance information on communication systems will be an advantage to users;
- In any case all diversions shall be kept damp and dust free to ensure dust is minimized hence easier visibility for drivers;
- Ensure Installation and maintenance of all construction signs, signals, markings, and other devices used to regulate traffic, including posted speed limits, warnings of sharp turns, or other special road conditions;
- Traffic personnel will be stationed on strategic points to help during the diversions.

10.1.18 Gender equality

To ensure gender equality, the proponent should apply the following approaches:

- Apply all Kenyan Constitutional requirements on gender throughout the project;
- Apply all guidelines under the National Gender and Equality Commission Act, 2011;
- Undertake gender mainstreaming at project design, implementation/ construction, operation and decommissioning stages;
- Incorporate best practices in gender mainstreaming from project partners;
- Developing the project sustainably by transforming the distribution of opportunities, resources and choices for males and females so that they have equal power to shape their own lives and contribute to their families, communities, and countries.

10.1.19 Minimizing occupational safety and health impacts

This should be mitigated as follows:

- Use protective barriers to shield livestock and pedestrians from vehicular traffic, regulation of traffic flow by warning lights, avoiding the use of flaggers if possible, design of the work space to eliminate or decrease blind spots, and ensure reduction of vehicle speeds in work zones. Training of workers in safety issues related to their activities, such as the hazards of working on foot around equipment and vehicles.
- Develop and enforce a fleet management plan for road construction that includes measures to ensure work zone safety for construction workers and the travelling public.
- Hoisting and lifting equipment should be rated and properly maintained, and operators trained in their use.
- Elevating platforms should be maintained and operated according to established safety procedures including use of fall protection measures (e.g. railings).
- Establishment of work zones to separate pedestrians and livestock travelling by foot from vehicular traffic and equipment by routing of traffic to alternative roads where possible.
- Ensure safe practices for work at night and in other low-visibility conditions, including use of high visibility safety apparel and proper illumination for the work space (while controlling glare so as not to blind workers and passing motorists).

- Barricade the area around which elevated work is taking place to prevent unauthorized access. Working under personnel on elevated structures should be avoided.
- Reduction of engine idling time in construction sites; Use of extenders or other means to direct diesel exhaust away from the operator; Ventilation of indoor areas where vehicles or engines are operated or use of exhaust extractor hose attachments to divert exhaust outside.
- Use of the correct asphalt product for each specific application and ensuring application at the correct temperature to reduce the fuming of bitumen during normal handling.
- Maintenance of work vehicles and machinery to minimize air emissions.

10.1.20 Minimizing negative community health and safety impacts

Community health and safety issues during the construction of the proposed road can be mitigated as follows:

- Installation and maintenance of all signs, signals, markings, and other devices used to regulate traffic, specifically those related to pedestrian facilities or bikeways.
- Installation and maintenance of all signs, signals, markings, and other devices used to regulate traffic, including posted speed limits, warnings of sharp turns, or other special road conditions.
- Implement pedestrian safety management strategies such as provision of safe corridors/ side road along the road alignment and construction areas, including tunnels and bridges (e.g. paths separated from the roadway which can be used by both pedestrians and livestock), and safe crossings (preferably over or under the roadway) both during construction and operation.
- Installation of barriers (e.g. guardrails, fencing, plantings) to deter pedestrian and livestock access to the roadway except at designated crossing points.
- Installation and maintenance of speed control and traffic calming devices at pedestrian crossing areas.
- Construction of roadside rest areas and bus stops at strategic locations to minimize driver fatigue. Installation of measures to reduce collisions between animals and vehicles (e.g. use of signs to alert drivers on road segments where animals frequently cross; construction of animal crossing structures; installation of fencing along the roadway to direct animals toward crossing structures; and use of reflectors along the roadside to deter animal crossings at night when vehicles are approaching.
- Ensure there is adequate wastewater disposal system to avoid breeding of malaria parasite transmitting mosquitos. Proper disposal of wastewater to minimize contamination of water supplies with typhoid causing organisms.
- Ensure health and safety measures as proposed in the ESMP apply to the letter for quarrying and earth borrowing activities.
- Targeting elimination of accidents rail crossings by use of a real-time warning system with signage to warn drivers of congestion, accidents, adverse weather or road conditions, and other potential hazards ahead.
- Prepare an emergency preparedness and response plan in coordination with the local community and local emergency responders to provide timely first aid response in the event of accidents and hazardous materials response in the event of spills.

10.1.21 Minimizing disturbance to wildlife

This will be mitigated as follows:

- Bury electrical supply lines in a manner that minimizes additional surface disturbance. Use overhead lines in cases where the burial of lines would result in further habitat disturbance.
- Develop a site and ROW reclamation plan that addresses both interim and final reclamation requirements and that identifies vegetation, soil stabilization, and erosion reduction measures.
- Ensure that interim reclamation of disturbed areas is conducted as soon as possible following facility construction.
- Conduct pre-disturbance surveys in order to locate site facilities away from important ecological resources (e.g., springs, important upland habitats, sensitive species populations).
- Ensure activities pose minimal impacts to downstream flora and fauna.
- Contact appropriate agencies (KWS) early in the planning process to identify potentially sensitive ecological resources that may be present in the project area.
- Explore opportunities for habitat enhancement through such practices as the placement of nesting boxes in rights of-way, bat boxes underneath bridges, and reduced clearance to conserve or restore native species.
- Develop a plan for control of noxious weeds and invasive plants that could occur because of new surface-disturbing activities at the site. The plan should address monitoring, weed identification, the way weeds spread, and methods for treating infestations. Require the use of certified weed-free mulch. Prohibit the use of fill materials from areas with known invasive vegetation problems.
- Ensure protection of important resources by establishing protective buffers to exclude unintentional disturbance.
- Use existing facilities and disturbed areas (e.g., access roads, graded areas) to the extent possible to minimize the amount of new disturbance. Configure new access roads and rights-of-way (ROWs) to avoid high-quality habitats and minimize habitat fragmentation.
- Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices.
- Minimize the number of stream crossings when locating access roads. When stream crossings cannot be avoided, use fill ramps rather than stream bank cutting. Design stream crossings to provide in-stream conditions that allow for and maintain movement and safe passage of living organisms.
- Develop site fencing in conjunction with appropriate natural resource agencies to either allow or prevent site access by wildlife species.
- Minimizing clearing and disruption of riparian vegetation.
- Minimize removal of indigenous plant species and replanting of indigenous plant species in disturbed areas.

10.1.22 Minimizing increased loss of human and animal life due to road accidents

This should be mitigated as follows:

Lowering of speed limits: Installation and use of relevant road safety signs, construction of road bumps, and road safety awareness program (information and awareness of road users).
Optical reflective dissuaders: Dissuaders serve to discourage the crossing of the road by the wildlife in the case of higher risk. The light from the vehicle approaching illuminates the reflecting

device and is reflected in the adjacent areas with reflection angles that are not visible and disturbing to drivers. Creating a protective light curtain for the fauna near the road. The coloration of these devices can be red, white or blue.

Road signs and information panels: The goal is to inform drivers to prevent accidents with the fauna and reduce the speed. The information boards can be made more evident when combined with two flash LED powered by a small solar panel. • Acoustic slowdown bars and slow systems in optical effect. The acoustic slowdown bars are made of bands posed on the roadway that emit noise to the passage of vehicles prompting the driver to reduce speed.

Maintenance of the road edge: The goal is to increase the visibility of the roadside (visibility at the roadside) and discourage access to the roadway

10.1.23 Mitigating reduced accessibility of neighbourhood areas

This should be mitigated as follows:

- Provide opening or crossing points in road barriers to allow crossing of pedestrians and livestock.
- Provide access roads linking key villages in affected areas.

10.1.24 Minimizing community conflicts

This should be mitigated as follows:

- Ensure all stakeholders and the public are involved in the planning process.
- Ensure proper identification and compensation of all persons who will lose businesses, trees and land.
- Obtain necessary permissions and approvals from the County Governments.
- Ensure EIAs are conducted for specific project activities such as sand harvesting, borrow pit and quarrying sites.
- Largely involve the community in the project through their leaders, take keen in timely addressing their grievances and ensure a good percentage of the local community members are employees in the project.

10.1.25 Mitigating sexual exploitation and child abuse

This should be mitigated as follows:

- Conduct awareness and educational programmes to workers and minors on the issue of sexual exploitation and child abuse;
- Provide hotlines for the reporting of such cases;
- Ensure that stern action is taken for offenders found to have committed sexual exploitation;
- Employ adults (18 and over) provided with a national identity card.

10.1.26 Mitigating Cumulative Impacts

Specific actions that may be needed to effectively manage cumulative impacts include the following:

- Collaborative engagement in other regional cumulative impact management strategies.
- Support from other stakeholders (County Governments, developers and communities) is sought to implement it

- Participation in regional monitoring programs to assess the realized cumulative impacts and efficacy of management efforts.
- Effect monitoring needed to assess the realized cumulative impacts is clearly defined and implemented.
- Project design changes to avoid cumulative impacts (location, timing, technology).
- Adaptive management approaches to project mitigation
- Mitigation of project impacts by other projects (not under control of the proponent to further minimize impacts).
- Ensure multiparty regional mitigation and/or management (e.g., additional mitigation of other developments, offsets, management programs) that may be needed to effectively manage cumulative impacts is also identified

10.2 Mitigation measures during the operation phase of the proposed Baragoi – Noth Horr road project

The following mitigation measures are applicable during the operation phase of the proposed project to mitigate the negative project impacts.

10.2.1 Mitigating noise pollution and excessive vibrations

- Install speed control measures such as bumps and ramble strips in the villages and towns where the road traverses;
- Enforcement of Traffic Act regulations to ensure that all vehicles using the road are in good condition all the time to avoid excessive noise generation;
- Install no hooting signs in sensitive areas such as near hospitals, schools, mosques and other sensitive centres.

10.2.2 Mitigation of impacts on livestock and wildlife

The Supervising Road Engineer and Environmental Social Officer will liaise with the Kenya Wildlife Service to identify the exact known wildlife crossing areas and ensure that appropriate safety signage is placed alongside the road warning motorists of ‘’dangers a head’’. At important crossing points, animal tunnels or culverts may be used to reduce collision rates, especially for protected or endangered species. This measure is expensive and will be used only at a few locations where it is both justified (by the importance of the animal population and the crossing route as recommended by KWS) and affordable (relative to the cost of the project and the funds available). It will also be important that the Supervising Engineer in liaison with the local administration take care of areas with high population of livestock so that appropriate measures such as culverts or signage is placed along the road warning motorists.

10.2.3 Minimizing fossil fuel consumption

- Use of automatic sensor solar lighting along the road corridor.
- Design an energy efficient road in terms of terrain, avoiding steep slopes and sharp bends which cumulatively influence fuel consumption levels per journey.
- Regular road maintenance will also ensure that movement of vehicles is not interfered with. This as a result will minimize consumption of fossil fuels due to unnecessary stopping along the road.

10.2.4 Minimizing storm water run-off

The proposed mitigation measures include:

- Use of storm water management practices that slow peak runoff flow, reduce sediment load and increase infiltration.
- Regular inspection and maintenance of permanent erosion and runoff control features.

10.2.5 Minimizing increased loss of human life and livestock due to road accidents

- Maintain pedestrian and livestock crossing points with foot bridges in certain key areas for instance near the villages and towns.
- Maintain under passes for livestock and wild animals at strategic locations along the road.
- Provide a side road parallel to the proposed tarmacked road for use by locals during transportation of livestock.
- Maintain parking areas and bus stops for trucks.

10.2.6 Minimizing negative community health and safety impacts

The proposed mitigation measures include:

Community health and safety issues will emerge during the operation of the road. The impacts will include dust, noise, and vibration from vehicles in transit. Significant community health and safety issues associated with the proposed road project will include pedestrian safety, traffic safety, and emergency preparedness.

Pedestrians and motor cyclists are at greatest risk of serious injury from collisions with moving vehicles. Collisions and accidents can involve a single or multiple vehicles, pedestrians or motor cyclists and animals. Emergency situations most commonly associated with road operations include accidents involving single or multiple vehicles, pedestrians, and/or the release of oil or hazardous materials. The night glare from vehicles will cause disturbances to local communities at night and interfere with their sleep. This problem is likely to be greater in the future as vehicular traffic is set to increase several folds. The impact scale is however considered to be moderate hence a value of 2.

10.2.7 Minimizing generation of solid waste

The recommended mitigation measures are similar as those presented in section 9.1.3 above.

10.2.8 Minimizing increased soil erosion risk and soil quality degradation

The recommended mitigation measures are similar as those presented in section 9.1.9 above.

10.2.9 Minimizing sexual exploitation and child abuse

The recommended mitigation measures are similar as those presented in section 9.1.25 above.

10.3 Mitigation measures during the decommissioning phase of the proposed Baragoi – North Horr road project

10.3.1 Minimizing solid waste generation

The recommended mitigation measures are similar as those presented in section 9.1.3 above.

10.3.2 Minimizing noise and vibration

The recommended mitigation measures are similar as those presented in section 9.1.1 above.

10.3.3 Minimizing dust emission

The recommended mitigation measures are similar as those presented in section 9.1.2 above.

10.3.4 Mitigating disruption and loss of businesses in the town centres traversed by the road

The recommended mitigation measures are similar as those presented in section 9.1.11 above.

10.4 Environmental risks to the project

In any project, there are risks associated with it during the project cycle. For the proposed Baragoi - North road project, the following environmental risks were identified and some recommendations to reduce their occurrence are outlined.

10.4.1 Flush floods along the road corridor

The project area is characterised by seasonal laggas and being a low-lying area, most parts of the road are prone to flooding during rainy seasons. Parts of the road are usually impassable during heavy downpour especially from upstream. The floods could be a risk to the project especially during construction and operation phases as they could lead to loss of properties, roads and even lives.
It will be prudent for the proponent to consider the highest recorded flood levels of the area and include the data in the design of the various stream crossings. During construction, it will also be prudent for the contractor to ensure measures have been put in place to provide adequate warning before flooding.
This will ensure adequate evacuation is done prior to the floods. A Storm Water Management Plan will also be requisite to state the measures to be taken during the flooding periods

10.4.2 Transport of dangerous goods

Dangerous goods are frequently transported in bulk presenting a potential risk of release to the environment in the event of accidents. Additionally, there is a potential for the release of diesel during fuelling operations. The recommended measures to prevent minimize, and control releases of hazardous materials during road transportation and use include the following:

- Use of tank cars and other rolling stock that meet national and international standards (e.g. thermal protection and puncture resistance) appropriate for the cargo being carried, and implementing a preventive maintenance program; and
- Preparation of spill prevention and control, and emergency preparedness and response plans, based on an analysis of hazards, including the nature, consequence, and probability of accidents.

Based on result of the hazard analysis, implementation of prevention and control measures which may include:-

- Routing and timing of hazardous materials transport to minimize risk to the community (e.g. restricting transport of hazardous materials in certain hours);
- Limiting the general speed of vehicles in developed areas;
- Construction of protective barriers and other technical measures (e.g. guardrails) at sensitive locations (e.g. water resources and settlements);
- Dissemination of emergency preparedness and response information to the potentially affected communities (e.g. emergency notification systems and evacuation procedures);
- Implementation of a hazardous material security plan and security awareness training, including provisions for personnel security, prevention of unauthorized access, and measures to reduce risks during storage and transport of hazardous materials; and Use of standardized fuel spill prevention systems.

10.4.3 Fire

If vegetation growth is left unchecked or slash from routine maintenance is left to accumulate within the right-of-way, sufficient fuel can accumulate that may promote bush fires. Recommended measures to prevent and control risk of bush fire include:

- Monitoring of right-of-way vegetation according to fire risk;
- Removal of blow down and other high-hazard fuel accumulations;
- Trimming, slashing, and other maintenance activities to avoid seasons when the risk of bush fires is high;
- Removal of maintenance slash or management by controlled burning. Controlled burning should adhere to applicable burning regulations, fire suppression equipment requirements, and typically should be monitored; and
- Planting and management of fire-resistant species (e.g. hardwoods) within, and adjacent to, right-of-way.

10.4.4 Wildlife attacks

Due to the project passing periphery of key wildlife zone, and the anticipated influx of people as construction workers at the project site; there will be increased risk of wildlife attacks like hyenas and foxes on people. This risk will however be mitigated hence low. Some of the measures include:-

- Construction camps to be located away from wildlife corridors.
- Develop construction camps site fencing in conjunction with appropriate natural resource agencies to prevent site access by wildlife species.
- Ensure 24-hour surveillance by engaging the services of day and night guards and Install CCTV cameras in strategic locations of the workers camps.
- Provision of adequate security by County and National Governments

10.4.5 Inter-ethnic Conflicts

The project area is inhabited by several ethnic groups: Samburu, Turkana and Gabra. As earlier discussed, there is continuous and sporadic conflict between all the ethnic groups. These conflicts are therefore likely pose a risk to the project development.

10.4.6 Cattle rustling

The inhabitants of the area Samburu, and Turkana tend to keep livestock. As earlier noted, the Turkana occasionally conflict over livestock with the Samburu Community.

It is important for both the County and National Governments to provide adequate security both during construction and operation phase of the proposed project. This will ensure that cattle rustling activities have been minimized.

10.5 Environmental risk management

The failure of environmental mitigation can result in serious impacts such as erosion, increased road accidents and disruption of the community lifestyles. Construction of a road also involves occupational health and safety risks to road workers, primarily in the areas of storage and handling of dangerous materials, and operation of heavy machinery close to traffic, slopes and watercourses. The anticipated risks in this project include:

- Exposure to excessive dust particles or toxic fumes from bitumen and other chemicals used in road works;
- Potential for collapse of trenches;
- Risk of accidents involving passing traffic;
- Risk of bush fires during dry seasons;
- Risk of rock falls during blasting; and
- Risk of fuel spills and therefore contaminating soil and groundwater.

The above risks can be mitigated to some extent through:

- Strengthening staff skills and training in environmental management;
- Monitoring environmental actions and responsibilities and making provision for remedial actions;
- Planning for remedial measures in case initial planned actions are not successful;
- Limiting time of exposure to dust particles, chemicals and noise;
- Provision of Personal Protective Equipment (PPE);
- Establishing safety and inspection procedures in materials handling, operating heavy equipment and construction of trenches;
- Safe handling of toxic materials, explosives and other hazardous substances.

10.6 Environmental monitoring plan

Environmental monitoring is an essential component of project implementation. An Environmental Monitoring Plan (EMP) provides mechanism of monitoring environmental impacts of a project during its execution to reduce their negative effects and to introduce standards of good practice to be adopted for all project works. The EMP facilitates and ensures the follow-up of the implementation of the proposed mitigation measures proposed in the ESMP. The parameters of the proposed Baragoi – Nort Horr road project that were identified for monitoring include: water quality, air quality, solid waste generation, Occupational Health and Safety risks, wildlife/livestock/human accidents, HIV/AIDS incidences, soil erosion, storm water drainage, livelihood and environmental risks. This is represented in the Table 26 below.

Table 10-1: Environmental monitoring plan for the proposed project

Environmental Component	Parameters to be monitored	Points to be monitored	Frequency of monitoring	Lab Materials and Equipment/Other Requirements	Responsibility
Water Quality	pH, Total Suspended Solids (TSS) and Total Dissolved Solids(TDS), heavy metals, oils and grease	Lagas, Lake Turkana boreholes	Quarterly	Sampling bottles, cooler box, Access to a NEMA accredited laboratory	Contractor and KeNHA
Air Quality	TSP, NOx, SO2, CO, Dust particles, particulate matter etc.	Construction, Quarrying and Earth Borrowing sites, campsites, towns and villages	Continuous, with quarterly air quality measurements	Air sampling equipment	Contractor and KeNHA
Solid Waste Generation	Slag, domestic refuse, metallic scraps, sludge, waste composition, treatment methods	Construction campsites	sites	-	Contractor and KeNHA
Occupational Health and Safety risks	Safety training for workers, accident reports and records, number and types of accidents, hazards	Construction campsites	sites	Incidents log-book	Contractor and KeNHA
Human Accidents	Total number of human accidents, categories of humans knocked, accident locations	Towns centres, market centres, water points	Continuous	Accident recording book, camera, field patrol vehicle, GPS device and Police	Contractor /KeNHA /Police
Wildlife Accidents	Total number of wildlife accidents, types of animals knocked, accident locations	Along the road especially between water points and townships	Continuous	Accident recording book, camera, field patrol vehicle, GPS device.	Contractor /KeNHA /KWS

Environmental Component	Parameters to be monitored	Points to be monitored	Frequency of monitoring	Lab Materials and Equipment/Other Requirements	Responsibility
Livestock Accidents	Total number of livestock accidents, types of animals knocked, accident locations	Along the road, and water points, livestock crossing points	Continuous	Accident recording book, camera, field patrol vehicle, GIS machine	Contractor /KeNHA /Police
HIV/AIDS Incidences	Training programmes, number of incidences, number of condoms distributed, seminars, and participants trained etc.	Campsites, construction sites, towns, villages,	Quarterly	Office Supplies	Contractor and KeNHA
Soil Erosion	Soils eroded, Turbidity in storm water and other water sources, sources and causes	Excavated areas, sloppy areas along the road	Continuous	Camera, field vehicle	Contractor and KeNHA
Storm Water Drainage	Rainfall volume, topography	Flood prone areas, culverts, water ways, lagas, low lying areas	Continuous	Rain-gauge, field survey maps	Contractor and KeNHA
Environmental Risks	Fire outbreak, floods etc.	Possible hazardous areas only	Continuous during operation stage	Field inspections and information from lead agencies	KeNHA

11. GRIEVANCES REDRESS MECHANISM

A grievance mechanism provides a way to reduce risk for the proposed project, offers communities an effective avenue for expressing concerns and achieving remedies, and promotes a mutually constructive relationship. A well-functioning grievance mechanism:

- Provides a predictable, transparent, and credible process to all parties, resulting in outcomes that are fair, effective, and lasting;
- Builds trust as an integral component of broader community relations activities; and
- Enables more systematic identification of emerging issues and trends, facilitating corrective action and pre-emptive engagement.

Within the proposed road Project, the following principles need to be established to ensure the effectiveness of the Grievance Mechanism (GM):

- Commitment to fairness in both process and outcomes.
- Dedication to building broad internal support across project lines.
- Mainstreaming responsibility for addressing grievances throughout the project, rather than isolating it within a single department.

The design of this Grievance Redress Mechanism (GRM) is aligned to international best practice and guidelines and has taken the following factors into consideration:

- Proportionality: Scaled to risk and adverse impacts on affected communities
- Cultural appropriateness: Considering culturally appropriate ways of handling community concerns.
- Accessibility: Clear and understandable mechanism that is accessible to all segments of the affected communities at no cost.
- Transparency and accountability: To project affected stakeholders at field level.
- Appropriate protection: Prevents retribution and does not impede access to other remedies.

Anticipated grievances in the proposed Project area would especially be in relation to disagreements on the relocation assistance values. Some of the issues that would call for dispute resolution mechanism may include:

- Clerical errors in data entry and creation of PAP's valuation database;
- Emerging issues such as change in estate administration of affected properties;
- Disputed ownership of an affected asset particularly where documentation could be lacking;
- Rejection of the awards by the PAPs that may be considered not adequate and representative of market value;
- Change of mind concerning compensation mode by a PAP demanding for example land-for-land where only cash payment is preferred;
- Handling of cultural issues where there are no clearly agreed precedents such as payment for compensation in a polygamous marriage, cultural and religious assets.

Therefore, it will be considered necessary for a Grievance Management Mechanism be formulated to handle such issues. Timely and affordable redress is important to ensure satisfactory resettlement and completion of the Project as scheduled. A committee will be formed to allow people to lodge

complaints or claims including customary law and usage without a cost and timely and satisfactory to that claim or compliant.

Special arrangements should also be made for women and other vulnerable groups to ensure that they have equal access to redress procedures. This will call for the inclusion of women or other vulnerable groups in the Grievance Redress Committee to facilitate the redress process or ensure that groups that are representing interest of women and other vulnerable groups take part in the process.

11.1 Process of Registering and Addressing Grievances

During the implementation of the proposed road Project, KeNHA will employ a Project Liaisons Officer (PLO) who shall work closely with the established Grievance Redress Committee (GRC) to maintain a complaint record database to enable complaint tracking and review. The Grievance Redress Mechanism will also engage existing levels of grievance dispute resolution mechanism that exist at Sub and at County levels. Conflict resolution will commence at the lowest grass root office (Assistant chief, chiefs, GRC, PLO, Sub County Grievance committee, County Grievance committee. Where these levels fail, the individual PAP has the right to take his case to the civil courts for litigation.

The overall process of grievance handling is as follows:

- Formation of Grievance Redress Committees which will include representatives of All PAP categories, Assistant chiefs and Chiefs. The committees shall elect the executive once they are confirmed during consultative meeting during implementation. At the formative stage inclusivity of its composition the elected members shall comprise of representatives of religious leaders, women leaders, youth leaders and People Living with Disability (PWD) who will be among the PAPs. The team will address all project related complaints.
- During the pre-implementation stage of the Project, the affected persons will be given copies of grievance procedures as a guide on how to handle the grievances among PAPs.
- The process of grievance redress will start with registration of the grievances to be raised for reference, and also to enable progress updates of the cases. The registration will capture Name of complainant; Contact/Physical Address; Description / nature of complain; Signature by Complainant and date. (The form will be completed in triplicate).
  - One copy for the Chiefs office.
  - A copy for complainant and.
  - A copy for the PLO.
- The chief will inform and consult with GRC to determine validity of a claim. If valid, the chief will call for a seating and notify the complainant of the outcome within 7 days.
- The project will use a local mechanism, which include chiefs and assistants' chiefs ailing from respective PAPs sub locations and locations. These will ensure equity across cases and also eliminate nuisance claims and satisfy legitimate claimants at low cost.
- Grievance procedures may be invoked at any time, depending on the complaint. No person or community from whom land or other productive assets are to be taken will be required to surrender those assets until any complaints s/he has about the method or value of the assets or proposed measures are satisfactorily resolved. Un-resolved land disputes will be referred to NLC
- To avoid repetitive claims, affected individuals, families and homesteads will be informed of the details of the GRM.

11.2 Mechanism for Appeal

Disputes not resolved by the Grievance Redress Committee (GRC) may be referred by KeNHA to a registered and licenced Arbitrator practising in Kenya and the arbitration will be governed by the Kenya Constitution 2010, the Arbitration Act (Chapter 49 of the Laws of Kenya). Arbitration agreements shall be enforced by the courts, which have the power to refer a dispute to arbitration.

If the Project Affected Person (PAP) is still not satisfied with the settlement after formal arbitration, other legal redress mechanisms may be sought such as appealing in court through litigation. This should however be a last resort mechanism to avoid dragging the Project, since Project implementation will not proceed until all major public grievances are addressed satisfactorily.

11.3 Closure of grievance

Every grievance will be disposed off within a period of thirty (30) days of its receipt and a final reply will be send to the complainant, containing details of resolution or rejection of the complaint, with reasons thereof recorded in writing.
A grievance will be considered as disposed off and closed in any of the following instances, namely:

- When the intermediary or entity regulated by KeNHA or Samburu and Marsabit Counties has acceded to the request of the complainant fully.
- Where the complainant has indicated in writing, its acceptance of the response of the intermediary or entity regulated by KeNHA or Samburu and Marsabit Counties.
- Where the complainant has not responded within forty-five (45) days of the receipt of the written response of the intermediary or entity regulated by KeNHA or Samburu and Marsabit Counties.
- Where the Grievance Redress Committee has certified under indication to the subscriber that the intermediary or entity regulated by KENHA or Samburu and Marsabit Counties has discharged its contractual, statutory and regulatory obligations and therefore closes the complaint.
- Where the complainant has not preferred any appeal within fourteen (14) days from the date of receipt of resolution or rejection of the grievance communicated by the intermediary or entity regulated by KeNHA or Samburu and Marsabit Counties.
- Where the decision of KeNHA or Samburu and Marsabit Counties in appeal has been communicated to such complainant.

11.4 Grievance Log

The Project Liaison Officer will ensure that each complainant has an individual reference number, and is appropriately tracked and recorded actions are completed. A record of the stages the claim goes through and the person/s responsible for an individual claim must be clearly recorded and information provided to the complainant. The record will show:

- Date the complaint was reported;
- Date the grievance was uploaded to the project database;
- Date information on proposed action was communicated to the complainant;
- Date the complaint was closed; and
- Date response was sent to the complainant.

11.5 Monitoring Complaints

The Project Liaison Officer will be responsible for:

- Providing the Project Resettlement and Compensation Committee with a weekly report detailing the number and status of complaints;
- Any outstanding issues to be addressed; and
- Monthly reports, including analysis of the type of complaints, levels of complaints, and actions to reduce complaints.

Table 11-1: Grievance Redress Mechanism Process

Process	Description	Time frame
Identification of Grievance	Face to face, phone message, mail recorded during public/community interaction	1 day
Grievance assessed and logged	Significance assessed and grievance recorded or logged (i.e. in a log book	4-7 days
Grievance is acknowledged	Acknowledgement of grievance through appropriate medium	7-14 days
Development of response	Grievance assigned to appropriate party for resolution	4-7 days
	Response development with input from management/ relevant stakeholders	7-14 days
Response signed off	Redress action approved at appropriate levels	4-7 days
Implementation and communication of response	Redress action implemented and update of progress on resolution communicated to complainant	10-14 days
Complaints response	Redress action recorded in grievance log book Confirm with complainant that grievance can be closed or determine what follow up is necessary	4-7 days
Close grievance	Record final sign off of grievance If grievance cannot be closed, return to step 2 or refer to sector minister or recommend third-party arbitration or resort to court of law.	4-7 days

12. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

12.1 Introduction

This chapter presents the Environmental and Social Management Plan (ESMP) that will need to be implemented by the proponent/ contractor to prevent or reduce significant negative impacts to acceptable levels. All the project components support infrastructure were considered when this ESMP was developed. Environmental management and social plans for all project phases have been outlined to cover:

- Design and Construction Phase.
- Operation Phase.
- Decommissioning Phase.

The following ESMP table forms the core of this ESMP for the construction, operational and decommissioning phases of the proposed road project. The following table details all necessary mitigation measures as well as the person responsible for implementing and monitoring such measures. The table should be used as checklist on site. Due to the magnitude of the project, compliance with the ESMP must be monitored periodically and reports prepared and provided at monthly site meetings during the construction phase and quarterly during the operations and maintenance period as required in EMCA, Cap 387. Annual audits will be conducted during both the construction, operation and maintenance phases.

12.2 Cost of implementation the ESMPs

For effective implementation of the ESMPs, the project must establish an Environment, Health and Safety (EHS) unit that will be responsible for Project environmental Monitoring and Evaluation to ensure compliance to NEMA and Occupational Health and Safety. The project proponent will be required to produce periodic reports on project environment monitoring to be sent to the concerned agencies for information and supervision. The project proponent will be responsible for all costs of implementing the project's EIA licence conditions, including the ESMPs and the actual costs of public involvement in the ESIA process. Hence all costs proposed in the ESMPs below will be incurred by the project proponent who may transfer all to the contractor/ concessionaire except those of land acquisition and resettlement (Resettlement Action Plan Implementation budget).

The costs outlined are current costs mainly for project environmental monitoring and evaluation to ensure compliance to NEMA and OHS. To estimate future costs, an increase to cover annual inflation should be applied. The costs for actual activities should be included in the main bill of quantities of the project.

12.3 Project ESMP Implementation

12.3.1 Role of Environmental, Health and Safety and Social Experts

The ESIA process culminates with the formulation of a comprehensive Environmental and Social Management Plan. To ensure the latter is fully implemented, the Contractor should be required to hire Environmental, Health and Safety (EHS) and social experts who will continuously advise on EHS and social components of the project implementation. Elements in the environmental and social management plan are expected to be integrated in the project with appropriate consultations with KeNHA through the supervising environmental and social experts. The EHS and social staff of the

contractor will also be expected to fully understand the engineering and management aspects of the project for effective coordination of relevant environmental issues listed in the Environmental and Social Management Plan.

12.3.2 Project supervision

The environment supervisor should be appointed by KeNHA (as the project client) to ensure effective implementation of the environmental management plan. It is expected that the project supervisor will engage the services of an EHS and social experts who should master all environmental recommendations and the proposed action plans, timeframes and expected targets. The experts shall be the liaison persons between the contractor and the KeNHA on the implementation of environmental, health, safety and social concerns associated with the implementation of the project.

In brief, we are recommending that the Contractor hires EHS and Social experts. The contract should also provide the role of the Supervision Engineer-EHS Supervisor and Social Supervisors. This team will be undertaking regular monitoring on the project to ensure compliance to the ESMP.

Table 12-1: Environmental and Social Management Plan – Design, Construction, Operation and Decommissioning Phases

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
Construction phase				
Noise Pollution and Excessive Vibrations	▪ Sensitize drivers of construction vehicles and machinery operators to switch off engines or machinery that are not being used. ▪ Ensure that all vehicles and construction machinery are kept in good condition all the time to avoid excessive noise generation. ▪ Ensure that all workers wear ear muffs and other personal protective gear/equipment when working in noisy sections. ▪ Ensure machines are switched off when not in use. ▪ Undertake loud noise and vibration level activities during off-peak hours during the day (i.e. between 8.00 am and 5.00 pm).	Contractor/KeNHA	Monthly	- - - -
Air Pollution due to Dust Generation and Air Emissions	▪ Sprinkling of water on dry and dusty surfaces regularly including the access roads. ▪ Use of waste water to sprinkle at the construction site to reduce excessive dust. ▪ Adherence to personal protective clothing such as dust masks. ▪ Enforce onsite speed limit regulations. ▪ Ensure machines and vehicles are properly and regularly maintained.	Contractor/KeNHA	Monthly	4,000,000.00
Solid Waste Generation	▪ Maximizing the rate of recycling of road resurfacing waste either in the aggregate (e.g. reclaimed asphalt pavement or reclaimed concrete material) or as a base. ▪ Incorporating recyclable materials to reduce the volume and cost of new asphalt and concrete mixes. ▪ Contracting of an ordinary waste and hazardous waste handler to collect and appropriately dispose wastes from camp sites.	Contractor/KeNHA	Monthly	1,500,000.00

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	▪ Collecting road litter or illegally dumped waste and managing it according to the recommendations in the General EHS Guidelines. ▪ Collecting animal carcasses in a timely manner and disposing them through prompt burial or other environmentally safe methods. ▪ Managing sediment and sludge removed from storm drainage systems maintenance activities as a hazardous or non-hazardous waste based on an assessment of its characteristics. ▪ Management of all removed paint materials suspected or confirmed of containing lead as a hazardous waste. ▪ Grinding of removed, old road surface material and re-use in paving, or stockpiling the reclaim for road bed or other uses.			
Energy Consumption	▪ Promote the use of solar energy, wind energy and energy efficient bulbs in workers base camps and for street lights in towns situated along the proposed road. ▪ Switch off lights when not in use. ▪ Install energy meters to monitor the consumption of power in workers camps. ▪ Ensure construction machinery and trucks are well maintained. ▪ Use energy-efficient construction machinery and trucks during construction phase of the project	Contractor/KeNHA	Monthly	To be determined.
Discharge of Wastewater, Sewage and Degradation of Water Quality	▪ Construct communal septic tank linked to a constructed wetland system. ▪ Promote recycling of wastewater in construction activities. ▪ Install meters in premises to control consumption of water. ▪ Ensure wastewater is channelled and treated in sewerage plants or disposed in septic tanks.	Contractor/KeNHA	Monthly	500,000.00.

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	▪ Ensure regular maintenance of plumbing system to avoid spillage of wastewater. ▪ Discharge of partially treated sewage into septic tanks. ▪ Ensure regular maintenance of plumbing system and septic tanks to avoid spillage of raw sewage.			
Water Abstraction Consumption	▪ Install water conserving taps and toilets. ▪ Install gutters on the roof of houses in workers camps to harvest rain water. ▪ Construct underground reservoir for storage of harvested rain water. ▪ Drilling of boreholes along the proposed road route to supplement existing water resources. ▪ Harvest surface runoff and use it for landscaping purposes or sprinkling on roads during construction.	Contractor/KeNHA	Monthly	6.500,000.00.
Modification of Hydrology of ASALs	▪ Control excessive abstraction of water from rivers, laggas and Lake Turkana. ▪ Avoid complete blockage of river channels during construction of bridges and culverts. ▪ Re-open all blocked river channels after construction of bridges. ▪ Quarries and pits for extraction of road construction materials to be used as water harvesting sites. ▪ Surface runoff on the sides of the road should be channelled in areas with gentle slopes to avoid erosion of the road sides. ▪ Construct over passes and bridges in areas occupied by rivers and wetlands.	Contractor/KeNHA	Monthly	-
Storm water generation and impact on drainage.	▪ Use of storm water management practices that slow peak runoff flow, reduce sediment load and increase infiltration.	Contractor/KeNHA	Monthly	1,000,000.00

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	▪ Use of vegetated swales, filter strips, terracing, check dams / water pans, detention ponds or basins, infiltration trenches and infiltration basins. ▪ Regular inspection and maintenance of permanent erosion and runoff control features. ▪ Paving in dry weather to prevent runoff of asphalt or cement materials.			
Soil Erosion Risk	▪ Ensure surface runoff generated on impervious surface is not channelled directly to steep slopes. ▪ Provide grassed water ways along the access roads. ▪ Construct flow breaks on roadside drainage channels. ▪ Promote harvesting of surface runoff for landscaping purposes.	Contractor/KeNHA	Monthly	500,000.00
Loss of Vegetation Cover and Biodiversity	▪ Siting roads and support facilities to avoid critical terrestrial habitat by utilizing existing transport corridors. ▪ Design and construct wildlife access to avoid or minimize habitat fragmentation. ▪ Minimize clearing and disruption of riparian vegetation. ▪ Provide adequate protection against scour and erosion and consider the onset of the rainy season with respect to construction schedules. ▪ Minimize removal of indigenous plant species and replant indigenous plant species in disturbed areas. ▪ Explore opportunities for habitat enhancement	Contractor/KeNHA/KFS	Monthly	3,000,000.00
Disruption and Loss of Businesses	▪ Provide miscellaneous support/assistance to community members as part of corporate social responsibility during construction. ▪ Educate squatters on the need to maintain free road reserve. ▪ Provide comprehensive health and safety education to squatters in affected towns.	Contractor/KeNHA	Monthly	4,000,000.00

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	▪ Promote other sources of livelihood among the local communities.			
Spread of STD, HIV and AIDS	▪ Develop a comprehensive STDS, HIV and AIDs control programme. ▪ Control of prostitution in main towns situated along the proposed road in collaboration with the Police and County Governments. ▪ Provision of STDs, HIV and AIDS prevention measures to workers. ▪ Creation of awareness of STDs, HIV/AIDS in workers camps.	Contractor/KeNHA /County Governments	Monthly	3,000,000.00
Interference of Existing Development Infrastructure	▪ Compensate for the relocation of other infrastructural public utilities already existing along the proposed road corridor such as power lines, water . ▪ Undertake an integrated system of planning for infrastructure development along the corridor for future developments. ▪ Ensure effective stakeholder participation in the design of the road.	Contractor/KeNHA /NLC	Monthly	Part of project cost (PPC)
Cultural Changes	▪ Provide community awareness programmes. ▪ Develop programmes to enhance cohesion between project employees and the local community. ▪ Comply with defined national or local cultural heritage regulations and provisions of World Bank Physical Cultural Resources. ▪ Consult with the affected Communities to identify cultural heritage of importance, and to incorporate into the client's decision-making process the views of the affected Communities on such cultural heritage.	Contractor/KeNHA	Continuous	-
Security Risk and Wildlife Human Conflicts	▪ Thoroughly screen workers, suppliers and distributors. ▪ Ensure 24-hour surveillance by engaging the services of day and night guards.	Contractor/KeNHA /KWS	Monthly	Part of project cost (PPC)

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	▪ Install CCTV cameras in strategic locations of the workers camps. ▪ Accord the local people the priority in employment. ▪ Ensure close liaison with the local Police Department.			
Interference to road use activities due to diversions and closures	▪ Avoid long traffic diversion roads. ▪ Water diversions to ensure dust is minimized hence easier visibility for drivers. ▪ Ensure Installation and maintenance of all construction signs, signals, markings, and other devices used to regulate traffic, including posted speed limits, warnings of sharp turns, or other special road conditions. ▪ Advance information on communication systems will be an advantage to users. ▪ Make Traffic circulation changes as per the Traffic Act Cap 403. ▪ Station Traffic personnel on strategic points to help during the diversions.	Contractor/KeNHA	Monthly	Part of project cost (PPC)
Gender Discrimination	▪ Apply gender Kenya constitutional requirements throughout the project. ▪ Apply all guidelines under the National Gender and Equality Commission Act, 2011. ▪ Undertake gender mainstreaming at project design, implementation/ construction, operation and decommissioning stages. ▪ Incorporate best practices in gender mainstreaming from project partners	Contractor/KeNHA	Monthly	-
Occupational Health and Safety	▪ Development of a transportation management plan for road construction that includes measures to ensure work zone safety. ▪ Establishment of work zones to separate workers on foot from traffic and equipment by routing of traffic to alternative roads.	Contractor/KeNHA	Monthly	400,000.00

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	▪ Use protective barriers to shield workers from traffic vehicles, regulation of traffic flow by warning lights, design of the work space to eliminate or decrease blind spots, and ensure reduction of maximum vehicle speeds in work zones. ▪ Training of workers in safety issues related to their activities. ▪ Ensure safe practices for work at night and in other low-visibility conditions, including use of high-visibility safety apparel and proper illumination for the work space. ▪ Barricade the area around which elevated work is taking place to prevent unauthorized access. ▪ Hoisting and lifting equipment should be rated and properly maintained, and operators trained in their use. ▪ Elevating platforms should be maintained and operated according to established safety procedures including use of fall protection measures (e.g. railings). ▪ Use of the correct asphalt product for each specific application and ensuring application at the correct temperature to reduce the fuming of bitumen during normal handling. ▪ Maintenance of work vehicles and machinery to minimize air emissions. ▪ Reduction of engine idling time in construction sites; Use of extenders or other means to direct exhaust away from the operator. ▪ Ventilation of indoor areas where vehicles or engines are operated or use of exhaust extractor hose attachments to divert exhaust outside.			
Community Health Safety	▪ Implement pedestrian safety management strategies such as provision of safe corridors along the road alignment and construction areas, including tunnels and safe crossings for pedestrians and cyclists.	Contractor/KeNHA	Monthly	Part of project cost (PPC)

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	▪ Installation of barriers (e.g. fencing, plantings) to deter pedestrian access to the roadway except at designated crossing points. Installation and maintenance of speed control and traffic calming devices at pedestrian crossing areas. ▪ Installation and maintenance of all signs, signals, markings, and other devices used to regulate traffic, specifically those related to pedestrian facilities or bikeways, speed limits, warnings of sharp turns, or other special road conditions. ▪ Construction of roadside rest areas at strategic locations to minimize driver fatigue. ▪ Installation of measures to reduce collisions between animals and vehicles (e.g. use of signs to alert drivers on road segments where animals frequently cross). ▪ Prepare an emergency preparedness and response plan in coordination with the local community and local emergency responders.			
Disturbance to Wildlife	▪ Siting roads and support facilities to avoid critical terrestrial and aquatic habitat by utilizing existing transport corridors. ▪ Design and construction of wildlife access to avoid or minimize habitat fragmentation. ▪ Avoidance or modification of construction activities during the breeding season and other sensitive seasons or times of day to account for potentially negative effects. ▪ Minimize clearance and disruption of riparian vegetation. ▪ Minimize removal of indigenous plant species, and replant indigenous plant species in disturbed areas. ▪ Explore opportunities for habitat enhancement through reduced clearance to conserve or restore native species.	Contractor/KeNHA/KWS/KFS	Monthly	Part of project cost (PPC)
Road Accidents	▪ Construct pedestrian crossing points in certain key areas. ▪ Create parking areas for trucks.	Contractor/KeNHA	Monthly	Part of project cost (PPC)

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	▪ Create bunks in towns. ▪ Design road bumps and rumble strips along key towns such as South Horr, Loiyangalani, Gus and North Horr.			
Reduced Accessibility Neighbourhood Areas	▪ Construct overpasses, underpasses or culverts in densely populated areas to facilitate safe crossing of the road. ▪ Provide opening or crossing points in road barriers to allow crossing of pedestrians.	Contractor/KeNHA	Monthly	Part of project cost (PPC)
Possible Displacement of Local Communities, Loss of Properties and Businesses	▪ The affected communities along the proposed road route will be compensated appropriately according to existing best practices. ▪ The proponent will need to ensure that the final designs of the proposed road will be realigned to ensure that displacements are minimized as much as possible. ▪ Ensure that the Resettlement Action Plan is done appropriately and professionally (implementation monitoring).	Contractor/KeNHA	Monthly	To be determined by Valuer.
Degradation of borrow and quarry areas	▪ All borrow /quarry areas will be refilled, re-vegetated and landscaped. In case it is not done, then such areas will be cordoned with barbed wire fence, with warning signs or be harnessed to form water pans or earth dams for the local community and wildlife. ▪ Haphazard borrowing and quarrying should be avoided. ▪ Prior investigation /assessments on the drainage and other environmental aspects should be conducted according to the specifications of the authorities. ▪ Borrow pits and quarries should be located far from the settlements. ▪ Ensure maximum use of existing quarries, already in operations. ▪ Degraded and barren areas, riverbeds, and wastelands to be used for borrowing materials.	Contractor/KeNHA	Monthly	6,000,000.00

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	▪ Use of productive lands will be prohibited. ▪ Lands could be selected through Community consultation, and sites subsequently developed into water pans or other productive purposes. ▪ In case of new borrow areas, all measures will be taken so that there will be no loss of productive soil, and all environmental considerations are to be met with. ▪ While turning borrow pits into artificial water pools for human and wildlife, always consider the risk of changing the natural behaviour of avian life in the project area. Such pools should be reduced in number.			
Community conflicts	▪ Ensure all stakeholders and the public are involved in the planning process. ▪ Ensure proper identification and compensation of all persons who will lose businesses and land. ▪ Obtain necessary permissions and approvals from the County Government ▪ Ensure EIAs are conducted for specific project activities such as sand harvesting, borrow pit and quarrying sites. ▪ Largely involve the community in the project through their leaders, take keen in timely addressing their grievances and ensure a good percentage of the local community members are employees in the project.	Contractor/KeNHA	Continuous	To be determined.
Sexual Exploitation/Child Abuse	▪ Conduct awareness and educational programmes to workers and minors on the issue of sexual exploitation and child abuse. ▪ Provide hotlines for the reporting of such cases. ▪ Ensure that stern action is taken for offenders found to have committed sexual exploitation. ▪ Employ adults(18 and over) provided with a national identity card.	Contractor/KeNHA	Continuous	To be determined.

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
Gender Based Violence	▪ Financial management training should be conducted to the PAPs and the employees. ▪ Have separate latrines for different genders. ▪ Provide a communication line to report such cases.	Contractor/KeNHA	Continuous	2,000,000.00.
Cumulative Impacts	Specific actions that may be needed to effectively manage cumulative impacts include the following: ▪ Project design changes to avoid cumulative impacts (location, timing, technology). ▪ Adaptive management approaches to project mitigation. ▪ Mitigation of project impacts by other projects (not under control of the proponent to further minimize impacts). ▪ Collaborative engagement in other regional cumulative impact management strategies. ▪ Participation in regional monitoring programs to assess the realized cumulative impacts and efficacy of management efforts. ▪ Effect monitoring needed to assess the realized cumulative impacts is clearly defined and implemented. ▪ Ensure multiparty regional mitigation and/or management (e.g., additional mitigation of other developments, offsets, management programs) that may be needed to effectively manage cumulative impacts is also identified ▪ Support from other stakeholders (County Governments, developers and communities) is sought to implement it.	Contractor/KeNHA	Continuous	3,000,000.00.

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
Operational phase				
Noise Pollution and Excessive Vibrations	▪ Enforcement of Traffic Act regulations to ensure that all vehicles using the road are in good condition all the time to avoid excessive noise generation. ▪ Install speed control measures in town areas South Horr, Loiyangalani, Gus and Noth Horr) such as bumps and ramble strips. ▪ Install no hooting signs in sensitive areas such as near schools, hospitals etc	Contractor/KeNHA	Monthly	Part of project cost (PPC)
Air Pollution due to Dust Generation and Air Emissions	▪ Reduction of traffic congestion in town areas. ▪ Enforcement of Traffic Act regulations to ensure that all vehicles using the road are kept in good condition all the time to avoid excessive emissions.	Contractor/KeNHA	Monthly	-
Impacts on livestock and wildlife	▪ Liase with KWS to ensure that important wildlife crossing corridors areas have developed underpasses such as culverts. ▪ Maintenance of road signs at appropriate areas to warn drivers on wildlife and livestock crossing paths. ▪ Maintenance of bumps and pedestrian crossing areas close to livestock pasture and watering areas.	Contractor/KeNHA	Continuous	Part of project cost (PPC)
Increased consumption of fossil fuels	▪ Design an energy efficient road in terms of terrain, avoiding steep slopes and sharp bends which cumulatively influence fuel consumption levels per journey. ▪ Use of automatic sensor solar lighting along the road corridor. ▪ Regular road maintenance will also ensure that movement of vehicles is not interfered with. This as a result will minimize consumption of fossil fuels due to unnecessary stopping along the road.	Contractor/KeNHA	Continuous	Part of project cost (PPC)
Increased Generation of Storm Water	▪ Use of storm water management practices that slow peak runoff flow, reduce sediment load and increase infiltration.	Contractor/KeNHA	Continuous	-

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	▪ Regular inspection and maintenance of permanent erosion and runoff control features. ▪ Use of vegetated swales, filter strips, terracing, check dams / water pans, detention ponds or basins, infiltration trenches and infiltration basins ▪ Repair works to be carried out in dry weather to prevent runoff of asphalt or cement materials.			
Loss of human and animal Life due to increased road accidents	▪ Provide a side road parallel to the proposed tarmacked road for use by locals during transportation of livestock. ▪ Maintain pedestrian and livestock crossing points with foot bridges in certain key areas for instance near the villages and towns. ▪ Maintain culverts for livestock and wild animals at strategic locations along the road. ▪ Maintain parking areas and bus stops for trucks. ▪ Conduct road safety sensitization programmes. ▪ Carry out Risk Assessment to identify risk areas and provide appropriate prevention measures.	Contractor/KeNHA	Continuous	10,000,000.00
Community Health and Safety	▪ Implement pedestrian safety management strategies such as provision of safe corridors along the road alignment and construction areas, including tunnels and bridges and safe crossings for pedestrians and cyclists. ▪ Maintenance of barriers (e.g. fencing, plantings) to deter pedestrian access to the roadway except at designated crossing points. ▪ Installation and maintenance of speed control and traffic calming devices at pedestrian crossing areas. ▪ Installation and maintenance of all signs, signals, markings, and other devices used to regulate traffic, specifically those related to pedestrian facilities or bikeways.	Contractor/KeNHA	Continuous	-

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	▪ Installation and maintenance of all signs, signals, markings, and other devices used to regulate traffic, including posted speed limits, warnings of sharp turns, or other special road conditions. ▪ Maintenance of roadside rest areas at strategic locations to minimize driver fatigue. ▪ Installation of measures to reduce collisions between animals and vehicles (e.g. use of signs to alert drivers on road segments where animals frequently cross). ▪ Prepare an emergency preparedness and response plan in coordination with the local community and local emergency responders. ▪ Comply with OSHA 2007 requirements, they include; ➢ Carrying out Safety Audits. ➢ Implementing DOSHS improvement orders. ➢ Carrying out EHS Risk Assessments. ▪ Involve all the relevant stakeholders during the audit so as to incorporate suggested EHS measures into the report.			
Increased Generation of Solid Waste	▪ Maximizing the rate of recycling of road resurfacing waste either in the aggregate (e.g. reclaimed asphalt pavement or reclaimed concrete material) or as a base. ▪ Incorporating recyclable materials to reduce the volume and cost of new asphalt and concrete mixes. ▪ Collecting road litter or illegally dumped waste and managing it according to the recommendations in the General EHS Guidelines. ▪ Provision of bottle and can recycling and trash disposal receptacles at parking lots, bus stops and bus stations to avoid littering along the road.	Contractor/KeNHA	Continuous	3,000,000.00

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	▪ Collecting animal carcasses in a timely manner and disposing them through prompt burial or other environmentally safe methods. ▪ Managing sediment and sludge removed from storm drainage systems maintenance activities as a hazardous or non-hazardous waste based on an assessment of its characteristics. ▪ Management of all removed paint materials suspected or confirmed of containing lead as hazardous waste. ▪ Grinding of removed, old road surface material and re-use in paving, or stockpiling the reclaim for road bed or other uses. ▪ Ensure implementation of the project's operation phase Waste Management Plan. ▪ Comply with EMCA Cap 387 Waste Management Regulations, 2006.			
Health and Occupational Safety	▪ When undertaking road repairs, use protective barriers to shield workers from traffic vehicles, regulation of traffic flow by warning lights, design of the work space to eliminate or decrease blind spots, and ensure reduction of maximum vehicle speeds in work zones. ▪ Training of workers in safety issues related to road maintenance activities ▪ When undertaking road repairs, ensure safe practices for work at night and in other low-visibility conditions, including use of high-visibility safety apparel and proper illumination. ▪ When repairing the highway, use asphalt product of appropriate specification and ensure application at the correct temperature to reduce the fuming of bitumen during normal handling. ▪ Maintenance of work vehicles and machinery to minimize air emissions.	Contractor/KeNHA	Continuous	-

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	▪ Reduction of engine idling time in construction sites; Use of extenders or other means to direct diesel exhaust away from the operator. ▪ Ventilation of indoor areas where vehicles or engines are operated or use of exhaust extractor hose attachments to divert exhaust outside. ▪ Carry out Safety Audits. ▪ Implement DOSHS improvement orders.			
Soil Quality Degradation	▪ Rehabilitate borrow areas. ▪ Revegetate cleared areas. ▪ Ensure proper drainage infrastructure along the road. ▪ Used Oil and spills should be disposed in an environmental friendly manner.	Contractor/KeNHA	Continuous	4,000,000.00
Risk of spread of invasive species	▪ Reduce open gaps in road reserves by planting appropriate tree species suitable for highway or road side tree planting. ▪ Monitor composition of species regenerating along road reserves and take prompt actions in case of emergence of invasive species. ▪ Carry out routine road reserves maintenance mainly to clear bushes that may harbour invasive species.	Contractor/KeNHA	Continuous	5,000,000.00
Decommissioning phase				
Demolition waste	Use of an integrated solid waste management system i.e. through a hierarchy of options: ➢ Source reduction. ➢ Recycling. ➢ Composting and reuse. ➢ Combustion. ➢ Sanitary land filling.	Contractor/KeNHA	At the time of decommissioning	-

Possible impacts	Mitigation measures	Responsible party	Frequency/Timing	Budget (Kshs)
	▪ All buildings, machinery, equipment, and others that will not be used for other purposes must be removed and recycled/reused as far as possible. ▪ All foundations must be removed and recycled, reused or disposed of at a licensed disposal site. ▪ Where recycling/reuse of the machinery, equipment, implements, structures, partitions and other demolition waste is not possible, the materials should be taken to a licensed waste disposal site. ▪ Donate reusable demolition waste to charitable organizations, individuals and institutions.			
Noise and Vibration	▪ Sensitize workforce including drivers of construction vehicles. ▪ Install sound barriers for pile driving activity. ▪ Install portable barriers to shield compressors and other small stationary equipment where necessary. ▪ Proper maintenance of all equipment. ▪ Workers near high level noise to wear safety and protective gear. ▪ Spray demolished piles of earth with water. ▪ Avoid pouring dust materials from elevated areas to ground ▪ Cover all trucks hauling soil, sand and other loose materials ▪ Provide dust screen where necessary. ▪ Implement an appropriate re-vegetation programme to restore the site to its original status. ▪ Consider use of indigenous plant species in revegetation	Contractor/KeNHA	At the time of decommissioning	-
Dust Emission		Contractor/KeNHA	At the time of decommissioning	-
Site degradation		Contractor/KeNHA	At the time of decommissioning	- -

13. CONCLUSION AND RECOMMENDATIONS

The ESIA study has established that the proposed development project by KeNHA is a worthy investment by the proponent and without a doubt will contribute significantly to the economic development of the country. This will be achieved through the prior discussed positive impacts namely; growth of the economy, boosting of the informal sector during the construction phase, provision of market for supply of building materials, employment opportunities, increase in government revenue and optimal use of land among others. The studies conducted on the proposed upgrading of Baragoi – North Horr (217Km) shows that indeed the project will pioneer development in the part of Kenya.

However, the ESIA study has established that the proposed project will also have some negative impacts. The negative environmental impacts that will result from establishment of the proposed project which include possible livestock-vehicular accidents, hydrology and water quality degradation, noise pollution, dust emissions, solid waste generation, increased water demand, increased energy consumption, generation of exhaust emissions, workers accidents and hazards during construction, possible exposure of workers to diseases, increased storm water among others can however be sufficiently mitigated.

The proponent of the proposed project shall be committed to putting in place several measures to mitigate the negative environmental, safety, health and social impacts associated with the life cycle of the project. It is recommended that in addition to this commitment, the proponent shall focus on implementing the measures outlined in the Environmental Management and Monitoring Plan as well as adhering to all relevant national and international environmental, health and safety standards, policies and regulations that govern establishment and operation of such projects in Kenya. It is expected that the positive impacts that emanate from such project shall be maximized as much as possible as exhaustively outlined within the report.

Considering the positive socio-economic and environmental benefits which will accrue because of the proposed development and the ESIA study having found no major impacts to arise from the development, it is our recommendation that the project be allowed to proceed on the understanding that the proponent will adhere to the mitigation measures recommended herein and will further still implement the proposed Environmental Management and Monitoring Plan to the letter. Kenya as a country has a big shortage of such road project developments especially in the Kenyan side. Therefore, the construction of the proposed project goes a long way in solving part of the existing challenges experienced on road transportation sector.

REFERENCES

1. *Inception Report September 2018*
2. *Environmental (Impact Assessment and Audit) Regulations, 2003*
3. *Government of Kenya: Environmental Management and Coordination Act (EMCA) – 1999*
4. *Kenya Law Reports*
5. *Kenya Gazette Supplement Acts, Environmental Management and Coordination (Water Standards) Regulations, 2006*
6. *Kenya Gazette Supplements Acts, The Land Titles Act (Cap281), 1910*
7. *Kenya Gazette Supplements Acts, The Registration of Titles Act (Cap 281), 1920*
8. *Public Health Act, (Cap 242)*

APPENDICES

Appendix 1: Project Location and Layouts

Appendix 2: NEMA Certificate

Appendix 3: EIA and Social Field Tools

Appendix 4: Public meetings list of attendants and minutes

Appendix 5: General Photos of the Project Area