
**CONSULTANCY SERVICES TO CONDUCT AN ENVIRONMENTAL AND
SOCIAL IMPACT ASSESSMENT (ESIA) FOR THE PROPOSED
ESTABLISHMENT OF OIL PALM PLANTATIONS IN MASAKA HUB,
UGANDA**

REF: MAAIF-NOPP/CONS/19-20/00004



**ENVIRONMENTAL AND SOCIAL IMPACT STATEMENT FOR THE
PROPOSED ESTABLISHMENT OF OIL PALM PLANTATIONS IN
KALUNGU DISTRICT**

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TABLE OF CONTENTS

DOCUMENT CONTROL	i
ESIA TEAM MEMBERS	ii
LIST OF FIGURES	x
LIST OF TABLES	xi
ABBREVIATIONS	xiii
EXECUTIVE SUMMARY	xiv
1. INTRODUCTION	29
1.1 The ESIA Requirement.....	30
1.2 Purpose of the ESIA	30
1.3 Specific objectives of the ESIA.....	30
1.4 Scope of ESIA.....	31
1.5 Terms of Reference (ToR).....	31
1.6 Approach to the ESIA	31
1.7 ESIA Structure	32
2. PROJECT DESCRIPTION	34
2.1 Basic Project Data	34
2.2 Project Objective.....	34
2.3 Nature of the Project.....	34
2.4 Project Justification.....	38
2.1 Location of the Project.....	40
2.1.1 General Project Location	40
2.1.2 Proposed site for development	42
2.2 Design and Engineering	48
2.3 Project Phases and Duration.....	49
2.4 Project Cost	49
2.5 Overview of Oil Palm growth conditions.....	49
2.6 Project Components/facilities	50
2.6.1 Crude Palm Oil Mill	50
2.6.2 Oil Palm Nursey	50
2.6.3 Nucleus Farm.....	50
2.6.4 Oil Palm Processing.....	50
2.7 Small holder/out grower farms.....	52
2.8 Labour force details	52
2.9 Energy sources.....	52
2.10 Water sources.....	52
2.11 Project Land Requirements	53
2.12 Project Execution and Activities	53
2.12.1 Pre-construction phase	53
2.12.2 Construction phase	53
2.12.3 Operation phase	53
3. ESIA METHODOLOGY	54
3.1 Introduction	54
3.2 Document and literature review.....	54
3.3 Stakeholder Consultation.....	55
3.3.1 Analysis of Stakeholders.....	55
3.3.2 Approach to consultation	56
3.4 Analysis of project alternatives	56
3.5 Environmental and Social Baseline Studies.....	57
3.5.1 Vegetation survey	57
3.5.2 Fauna survey	57

3.5.3	Expected Outputs from Ecological/Biological Surveys.....	61
3.5.4	Agromony Assessment.....	62
3.5.5	Economic Valuation Assessment	62
3.5.6	Geology and Soils Assessment.....	62
3.5.7	Hydrology and Topography Assessment.....	62
3.5.8	Noise and Air Quality Assessment	62
3.5.9	Socio-economic survey.....	67
3.5.10	Archaeological and Cultural Heritage Assessment	67
3.6	Analysis of impact significance	68
3.7	Identification of mitigation/elimination/enhancement measures to the identified impacts ...	70
3.8	Environmental, Social Management and Monitoring Plan	70
4.	POLICY, LEGAL, REGULATORY, AND INSTITUTIONAL FRAMEWORK	71
4.1	National Policy Framework.....	71
4.1.1	The National Environment Management Policy, 1994	71
4.1.2	National Agricultural Policy, 2013.....	71
4.1.3	The National Fertilizer Policy 2016.....	72
4.1.4	The National Seed Policy, 2018	72
4.1.5	Uganda National Land Policy, 2013	72
4.1.6	National Gender Policy, 2007	73
4.1.7	National Policy for the Conservation and Management of Wetland Resources, 1995	73
4.1.8	National Water Policy, 1999	73
4.1.9	Occupational Health and Safety Policy	74
4.1.10	HIV/ AIDS Policy, 2011	74
4.1.11	National Environment Health Policy, 2005	75
4.1.12	The Uganda Wildlife Policy, 2014.....	75
4.1.13	The National Energy Policy, 2002	75
4.1.14	Uganda National Culture Policy, 2006.....	75
4.2	National Legislative Framework	76
4.2.1	The Constitution of the Republic of Uganda, 1995.....	76
4.2.2	National Environment Act, No.5 of 2019	76
4.2.3	The Land Act, Cap 227	76
4.2.4	The Physical Planning Act, 2019.....	77
4.2.5	The Uganda Wildlife Act, 2019	77
4.2.6	The Public Health Act, Cap 281.....	77
4.2.7	The Water Act, Cap 152	78
4.2.8	Workers' Compensation Act, 2000	78
4.2.9	Employment Act, 2006.....	79
4.2.10	Occupation Safety and Health Act, 2006.....	79
4.2.11	The Children's Act, Cap 59.....	79
4.2.12	The Penal Code Act, Cap 120 (as Amended, 2007).....	80
4.2.13	The Historical and Monuments Act, Cap 46.....	80
4.2.14	The Plant Protection and Health Act 2015	81
4.2.15	The Traffic and Road Safety Act, 1998	81
4.2.16	Petroleum Supply Act 2003	81
4.3	National Regulatory Framework.....	82
4.3.1	The National Environment (Environmental and Social Assessment) Regulations, S.I No.143 of 2020	82
4.3.2	National Environment (Waste Management) Regulations S.I. No. 49 of 2020.....	82
4.3.3	National Environment (Wetlands, Riverbanks and Lakeshores Management) Regulations S.I No. 2/2000.....	82
4.3.4	The National Environment (Standards for Discharge of Effluent into Water or Land) Regulations, 2020.....	83
4.3.5	National Environment (Noise Standards and Control) Regulations, 2003.....	84

4.3.6	Draft National Air Quality Standards, 2006.....	85
4.3.7	National Environment (Audit) Regulations, 2020	86
4.3.8	The National Environment (Management of Ozone Depleting Substances and Products) Regulations 2020	86
4.3.9	National Environment (Control of Smoking in Public Places) Regulations, 2004	86
4.3.10	National Environment (Conduct and Certification of Environmental Practitioners) Regulations 2003	87
4.3.11	The National Environment (Minimum Standards for Management of Soil Quality) Regulations, 2001	87
4.4	Institutional Framework.....	87
4.4.1	National Environment Management Authority (NEMA)	87
4.4.2	The Ministry of Agriculture, Animal Industry and Fisheries	87
4.4.3	The Ministry of Water and Environment	88
4.4.4	Directorate of Labour, Employment and Occupational Health & Directorate of Gender and Social Development.....	88
4.4.5	Ministry of Lands, Housing and Urban Development (MLHUD).....	89
4.4.6	Ministry of Tourism, Wildlife and Antiquities (MoTWA)	89
4.4.7	Ministry of Local Government	89
4.4.8	Kalungu District Local Government	89
4.4.9	Non-Governmental Organizations and Civil Society Organizations.....	90
4.5	International Conventions and/or Agreements	90
4.5.1	The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal.....	90
4.5.2	Stockholm Convention on Persistent Organic Pollutants, 2001	90
4.5.3	The Strategic Approach to International Chemicals Management (SAICM).....	91
4.5.4	The Convention on Biological Diversity (CBD).....	91
4.5.5	The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).....	91
4.5.6	African Convention on the Conservation of Nature and Natural Resources, 1982.....	92
4.5.7	The United Nations Framework Convention on Climate change (UNFCCC), 1992	92
4.5.8	Convention for the Safeguarding of the Intangible Cultural Heritage, 2003	92
4.5.9	The Ramsar Convention on Wetlands of International Importance, 1971	92
4.6	International Standards and Guidelines	93
4.6.1	IFC Environmental Health and Safety Guidelines	93
4.6.2	IFAD's Social, Environmental and Climate Assessment Procedures (SECAP)	94
4.6.3	Round Table Sustainable Palm Oil (RSPO) Principles and Criteria	95
4.7	Approvals, licenses and permits.....	98
5.	ANALYSIS OF PROJECT ALTERNATIVES	100
5.1	The, "No Project Option"	100
5.2	The Project Site	101
5.3	Project Technology & Operations Option	101
6.	ENVIRONMENT AND SOCIO-ECONOMIC BASELINE.....	102
6.1	Socio-Economic and Cultural Environment.....	102
6.1.1	Political and Administrative Structure	102
6.1.2	Population and demographic characteristics	102
6.1.3	Education and Literacy	102
6.1.4	Ethnic Composition	102
6.1.5	Land Use and Land Tenure	103
6.1.6	Economic Activities	107
6.1.7	Employment	107
6.1.8	Health.....	107
6.1.9	HIV/AIDS.....	109
6.1.10	Availability and Access to Water.....	109

6.1.11	Sanitation	109
6.1.12	Transport and Communication	110
6.1.13	Energy Sources	111
6.1.14	Ecosystems Services and their Value	111
6.1.15	Settlement Patterns	112
6.1.16	Archeological and Cultural Heritage Assessment	112
6.1.17	Gender issues	115
6.1.18	Vulnerability.....	115
6.1.19	Energy Sources	115
6.1.20	Transport and Communication	116
6.1.21	Security	116
6.1.22	Civil Society Organizations (CSOs).....	116
6.1.23	HIV/AIDs	117
6.1.24	Urbanization and Development	117
6.2	Physical Environment	117
6.2.1	Climate and Climate change.....	117
6.2.2	Soils and Geology	118
6.2.3	Topography.....	120
6.2.4	Hydrology and Drainage and Water Quality	120
6.2.5	Noise Assessment	126
6.3	Biological Environment	127
6.3.1	Flora	127
6.3.2	Fauna	148
7.	STAKEHOLDER ENGAGEMENT.....	167
7.1	Stakeholder disclosure and engagement requirements.....	167
7.2	Objectives of stakeholder engagement	167
7.3	Stakeholder identification and composition	167
7.3.1	Issues/comments raised by stakeholders.....	169
6.4	Grievance Redress Mechanism (GRM)	182
7.3.2	Monitoring and Reporting of Grievances	184
7.3.3	Disclosure of Grievance Mechanism	185
8.	ASSESSMENT OF IMPACT SIGNIFICANCE AND PROPOSED MITIGATION MEASURES.	186
8.1	Project positive impacts	186
8.1.1	Direct Employment opportunities	186
6.4.1	Improved Income	187
8.1.2	Improved Infrastructure	187
8.1.3	Widened revenue base.....	188
8.1.4	Skills Development	188
8.1.5	Land restoration of previously unproductive areas	188
8.1.6	Prevention of loss of soil fertility through intercropping.....	189
8.1.7	Increase in biomass due to increase in vegetation cover	189
8.1.8	Recovery of archaeological materials	189
8.1.9	Exposure to archaeological and cultural resources	190
8.1.10	Climate regulation.....	190
8.2	Negative impacts from site clearance, preparation, and palm oil planting.....	190
8.2.1	Change in land use.....	190
8.2.2	Conflicts between workers and community.....	190
8.2.3	Nutritional Disorders	191
8.2.4	Dependency on the nucleus farm.....	191
8.2.5	Labour Issues	192
8.2.6	Disruption of current sources of livelihoods	192
8.2.7	Increase in spread of HIV/AIDs and other STIs	192

8.2.8	Influx of people from migrant workers	193
8.2.9	Vulnerability as result of gender related issues.....	193
8.2.10	Shift in crop type growing	194
8.2.12	Loss of invertebrate fauna as a result of weeding.....	194
8.2.12	Climate change.....	194
8.2.13	Plant species diversity decline	194
8.2.14	Decline in natural habitats mostly forest, and wetland areas.....	194
8.2.15	Decreased availability of forest products.....	196
8.2.16	Decline of energy resources/ increase in charcoal burning practices.....	196
8.2.17	Soil erosion	196
8.2.18	Impacts on Fauna	197
8.2.19	Biodiversity conflicts.....	198
8.2.20	Water pollution and threat of eutrophication.....	199
8.2.21	Increased gaseous emission of particulate matter.....	199
8.2.22	Pressure on infrastructure as a result of influx of people	201
8.2.23	Impacts to archaeological and cultural sites.....	201
8.2.24	Occupational hazards from crop management	202
8.2.25	Noise nuisance.....	202
8.2.26	Loss of fertility due to excess application of fertilizers and pesticides	203
8.3	Cumulative impacts	203
8.4	Decommissioning impacts.....	204
8.4.1	Occupational hazards	204
8.4.2	Loss of carbon sink	204
8.4.3	Soil erosion and water pollution.....	205
8.4.4	Poor waste management.....	205
8.4.5	Loss of income for palm oil farmers and other employees.....	205
8.4.6	Impacts to soils and to crop farming.....	205
9	ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN	216
9.4	Responsibility for implementing the ESMP	216
9.4.1	Project Manager.....	217
9.4.2	EHS Department.....	217
9.4.3	Community Relations Department.....	219
9.4.4	Contractor	219
9.4.5	Any other personnel involved in the project (Smallholder farmers and Employees)	219
9.5	Reporting and Documentation.....	220
9.5.1	External Reporting and Communication.....	220
9.5.2	Internal Reporting and Communication	220
9.6	ESMP Review and Amendments	221
9.7	Training, Awareness and Competency	221
9.8	Monitoring, Review and Audit.....	221
9.9	Project Environmental and Social Management Plan	221
9.10	ESMP link to other EHS Management System Plans	222
9.11	Plans, Policies and Procedures.....	222
10	CONCLUSION AND RECOMMENDATIONS.....	249
10.4	Conclusion	249
10.5	Recommendations	249
	REFERENCES.....	251
	APPENDICES.....	254
	Appendix 1: Letter of Approval of Terms of Reference for the ESIA of Palm Oil Plantations in Kalungu District	254
	Appendix 2: Minutes of Meetings with stakeholders	257
	Appendix 3: List of small holders' farms in Kalungu District.....	268
	Appendix 4: Stakeholder Attendance lists in Kalungu District.....	274

Appendix 5: Soil Test Results.....	283
Appendix 6: List of plant species recorded within Kalungu District Landscape	284
Appendix 7 Coordinates of where invasive plant species were recorded.....	289
Appendix 8: Water Quality Test Results.....	290
Appendix 9: Climate Change mitigation potential of the National Oil Palm project with the Ex-Ante Carbon Balance Tool (EX-ACT)	291

LIST OF FIGURES

Figure 1-1: ESIA Process in Uganda.....	32
Figure 2-1: Identified Hubs for the NOPP	41
Figure 2-2 Locations of Small Holde Farms in Kalungu District	43
Figure 2-3: Proposed locations of small holder farms in Kalungu District	44
Figure 3-1 Summary of Impact Significance Assessment Methodology	69
Figure 6-1 Land use Bukulula and Lwabenge Subcounties and Lukaya Town Council	105
<i>Figure 6-2: Land use in Kalungu District.....</i>	<i>106</i>
Figure 6-3 Some of the water sources in Kalungu District	109
Figure 6-4 Solid wastes dumped in Bajja Village in Lukaya Town Council	110
Figure 6-6: Map showing soils and geology of Kalungu District.....	119
<i>Figure 6-6: Topography of Kalungu District</i>	<i>120</i>
Figure 6-8: Hydrology of Kalungu District	124
Figure 6-8: Land Use Land Cover Map of Kalungu District.....	128
Figure 6-9 : Dominant vegetation types of Kalungu District.....	129
Figure 6-10 Farmland with Musa spp, Amaranthus spp and Acacia hockii	131
Figure 6-11: Plant life form composition across Kalungu District landscape	147
Figure 6-14 Avifauna species diversity according to the survey sites	149
Figure 6-15: Number of species per taxa recorded in Lukaya Town Council	150
Figure 6-16: Number of species per taxa recorded at Lwabenge Sub-County.....	151
Figure 6-17: Number of species per taxa recorded at Bukulula Subcounty site	152
Figure 6-18: Photos of bird species taken during the survey	152
Figure 6-19: Fish species recorded within the project area	164
Figure 7-1 Pictorial view of some of the stakeholder meetings conducted during the ESIA. ...	179
Figure 7-2: Basic Steps of Grievance Tracking and Redress Process.....	182
Figure 7-3: Typical Steps of a grievance mechanism	183

LIST OF TABLES

Table 2—1: Basic Project Data	34
Table 2—2: Environmental and Social Risk categories	35
Table 2—3 Coordinates of small holder farm sites in Kanungu District.....	45
Table 3—1 . Geo-referenced positions of the sampling sites.....	60
Table 3—2 shows the list of equipment that was used for the air quality survey in the project area.	63
Table 3—3: Equipment used to Measure Air Quality	63
Table 3—4: Airquality measurements taken at Kalangala Oil Palm Project for bench marking.....	65
Table 3—5: Noise measurements taken in Kalangala Oil Palm Project for bench marking	66
Table 4—1: Standards for general chemicals and micro-biological discharge	83
Table 4—2: Table Standards for inorganic substances effluent discharge Effluent requirements	84
Table 4—3: Table Permissible Noise Levels	85
Table 4—4: Draft National Air Quality Standards, 2006.....	85
Table 4—6: IFC General Environment Health and Safety Guidelines.....	93
Table 4—7: Necessary permits, approvals and licenses required by the project.	98
Table 6—1: Population of project affected sub counties	102
Table 6—2 Health facilities in Kalungu District	108
Table 6—3: Health centres in the project area	108
Table 6—4 : Distribution of Household by source of Energy for Cooking and lighting	111
Table 6—5: Archaeological and cultural heritage baseline findings in Kalungu District	113
Table 6—6: Distribution of Household by Source of Energy for Cooking and Lighting.....	115
Table 6—7: Some of the NGOs operating the Kalungu	117
Table 6—8 Areas of hydrological and water quality importance in Kalungu District.....	121
Table 6—9 Wetlands in the project area in the project area	121
Table 6—10 Rivers in the project area	121
Table 6—11: Ambient Air quality values at selected points in Kalungu District	125
Table 6—12: Noise assessment recorded at selected points in Kalungu District.....	126
Table 6—13: Forest Types and Coverage.....	127
Table 6—14: Land Cover classification of Kyotera District	128
Table 6—15 Some Farmlands in Kalungu District	132
Table 6—16: Avifauna species richness for the surveyed sites.....	148
Table 6—17 List of all Avifauna species observed and recorded in the survey sites	153
Table 6—18 Categories of birds according to their IUCN status and habitat requirements....	156
Table 6—19: Species of mammals recorded in Kalungu District	160
Table 6—20: Species composition and relative abundance (%) of phytoplankton (No. of organisms per milliliter)	161
Table 6—21: Species composition and relative abundance (%) of Zooplankton (No. of organisms per litre).....	161
Table 6—22: The species composition and relative abundance (%) of macro-invertebrates (Benthic fauna).....	162
Table 6—23: The species composition of fish in the project area	163
Table 6—24 Amphibian species recorded in the project area.....	165
Table 6—25 Checklist of Reptile species encountered during the survey.....	166
Table 7—1 List of Stakeholders Consulted	168
Table 7—2: Issues/concerns raised by project stakeholders	169
Table 7—3 Response to the approval of the Terms of Reference for the ESIA	180
Table 7—4: Summary of Roles and Responsibilities	184
Table 8—1: Vegetation identified on some sampled farms in Kalungu District	195

Table 8—2:Summary of the results of impact assessment of the project.....	206
Table 9—1: Specific Management Plans and Policies.....	222
Table 9-2 Environmental and Social Management Plan	224

ABBREVIATIONS

4P	Public, Private, Producer Partnership
BUL	BIDCO Uganda Limited
CPO	Crude Palm Oil
EHS	Environment Health and Safety
EIA	Environmental Impact Assessment
ESIA	Environmental & Social Impact Assessment
ESMP	Environmental and Social Management Plan
FFB	Fresh Fruit Bunches
GDP	Gross Domestic Product
GHG	Green House Gases
GIS	Geographical Information System
GoU	Government of Uganda
HCS	High Carbon Stocks
HDI	Human Development Index
HH	Household
HIV	Human Immuno-deficiency Virus
ICT	Information and Communication Technologies
IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
IUCN	International Union for Conservation of Nature
LC	Local Council
MAAIF	Ministry of Agriculture Animal Industry and Fisheries
NEA	National Environmental Act
OP	Oil Palm
OSH	Occupational Safety and Health
PMU	Project Management Unit
PPE	Personal Protective Equipment
PS	Performance Standard
SECAP	Social, Environmental and Climate Assessment Procedures
VODP	Vegetable Oil Development Project

EXECUTIVE SUMMARY

Project Overview

The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) intends to implement the National Oil Palm Project (NOPP) in the mainland areas located in a narrow belt (25-30 km) along Lake Victoria and surrounding the two island districts of Kalangala and Buvuma, but also areas in the western (Bundibugyo, Masindi) and north-western (Arua) parts of the country. The Project will work in geographical hubs, where a hub is defined as “an agro- climatically suitable area (not an administrative district), within a radius of 30 km around a planned or actual Crude Palm Oil (CPO) mill, and in which a minimum of 3,000 ha of Oil Palms (OP) production can be assured.” It is this radial area that marks the limits of financial viability for the producers, who may be smallholders plus nucleus estate.

Drawing on this model, NOPP will concentrate its activities on smallholder Oil Palm development in Buvuma Island, Mayuge, Masaka, Kalangala (Bugala and outlying islands, where it will consolidate the investments to date, but will not support an expansion in the area under OP production, and around Kiryandongo or in Buikwe (to be confirmed from studies).

This Environmental and Social Impact Statement (ESIS) presents findings of the Environmental and Social Impact Study of the proposed establishment of smallholder oil palm plantations in Kalungu District, which is one of the components of Masaka Hub. Masaka Hub comprises Masaka, Kalungu and Kyotera Districts.

This ESIS/ESIA report meets the requirements of the National Environment Act (2019), the National Environment (Environmental and Social Assessment) Regulations, 2020 and Guidelines for Environmental Impact Assessment in Uganda, 1997. The ESIA will follow IFAD’s Environmental and Social Values and Principles, the Social, Environment and Climate Assessment Procedure (SECAP) and Round Table on Sustainable Oil Palm (RSPO) Principles and Criteria.

Project Objective

The overall goal of the NOPP is inclusive rural transformation through oil palm cultivation in Uganda. To achieve this goal, the Project’s specific development objective is to sustainably increase rural incomes through the establishment of an efficient oil palm industry that complies with modern environmental and social standards.

The outcomes that would make the achievement of the development objective possible are summarized below, together with the related Project components and action areas:

- Scaling-up investment in smallholder oil palm development
- Livelihood’s diversification and resilience
- Oil Palm sector development framework

ESIA Requirement

Schedule 5 of the National Environmental Act, 2019, lists projects which require mandatory ESIA, and section 6 lists agricultural investment, livestock, range management and fisheries, as one of such projects. Specifically, large scale cultivation of 20 hectares and more (subsection (a), is the subject of this ESIA, and the findings will be submitted by the developer to the National Environment Management Authority (NEMA for review and approval.

Aim the ESIA

The purpose of the Environmental and Social Impact Assessment (ESIA) is to identify and assess the potential environmental and social impacts of the proposed project and propose mitigation measures and management actions to avoid or minimize the negative impacts.

The ESIA findings shall guide decision makers to understand the environmental and social consequences of the proposed project to facilitate the protection, restoration and enhancement of the environment and socioeconomic setting of the project area.

Proposed Project location

Kalungu is one of the 3 districts selected to implement the Oil Palm Project within the Masaka Hub. The district was carved from Masaka District, found in the central part of Uganda, named after the main town of the district Kalungu where the headquarters are located. Kalungu District is bordered by Gomba District to the north, Butambala District to the northeast, Mpigi District to the east, Masaka to the south and Bukomansimbi District to the west. The chief town of the district, Kalungu is located 21 Km by road, northwest of Masaka, the largest metropolitan area in the sub-region.

The proposed project is targeting to develop small holder farms in Bukulula, Lwabenge Subcounties and Lukaya Town Council.

Project components and activities

Implementation activities are outlined below per phase (preconstruction, construction, operation and decommissioning);

Project components
<ul style="list-style-type: none">▪ Oil Palm Nursey (separate ESIA to be undertaken)▪ Nucleus Farm (separate ESIA to be undertaken)▪ Small holder farms (subject of this ESIS)▪ Crude Oil Plam Mill (separate ESIA to be undertaken)
Project activities

Pre-construction/Design Phase <ul style="list-style-type: none"> ▪ Designing and surveying of the project site; ▪ Environmental and Social Impact Assessments; ▪ Identification of small holder farmers ▪ Recruitment of workers 	Construction Phase <ul style="list-style-type: none"> ▪ Transportation of construction materials and machinery to the proposed site ▪ Vegetation clearance ▪ Excavation and casting of concrete according to design considerations ▪ Leveling off the ground, excavation, and casting of concrete for columns and building foundations. ▪ Demarcation of different plantation blocks and construction of access roads.
	Operation and Maintenance Phase Growing of Oil Palms alongside manufacturing of Crude Palm Oil at the mill that will then be transported to the existing palm oil refinery plant in Jinja.

Poor and vulnerable households will be directly targeted by NOPP investments in oil palm production and in alternative economic opportunities and mitigation of social risks. Overall, an estimated 30,800 households will directly benefit from these NOPP activities, without considering the sensitization activities aimed at whole communities. On the basis of an average household size of 5, these figures translate to 154,000 individuals. Of these, over 11,000 households will benefit as smallholder OP growers; and a total of 23,700 households are expected to benefit from the Alternative Economic Livelihoods activities, out of which 19,300 will be additional, non-OP growing households. A total of almost 8,100 households will benefit from the mitigation of social risk (household mentoring) activities: these will include not only OP growers and non-OP growers, but also workers in the nucleus estates.

Project cost

The estimated investment cost of the Kalungu component of the project is Uganda Shillings 22, 200,000,000 (twenty-two billion, two hundred million Uganda Shillings Only).

Project Land Requirements

In the Masaka Hub, the project targets establishment of 3,000 ha of smallholder oil palm plantations. The Kalungu component of the project is expected to contribute not less than 500ha of smallholder oil palm plantations.

ESIA Methodology

The ESIA was conducted in accordance with the National Environmental Act, 2019, the National (Environment and Social Assessment) Regulations, 2020 and the Guidelines for Environment Impact Assessment in Uganda, 997. A number of methods were used. These included but were not limited to: Desk Study (literature review), biodiversity surveys (flora, birds, herpetofauna, aquatic biota, insects), socio-economic surveys, archeology, and cultural heritage assessment agronomy assessment, hydrology/water quality assessment, climate change assessment, noise and air quality assessment, economic valuation and public/stakeholder consultations.

Analysis of impact significance: Baseline environmental and social conditions were described in detail and valued on a continuous scale from 'low value' to 'high value', which was assigned to the impact zones and the characteristics thereof. Values were assigned to elements of the biological environment such as flora, aquatic ecosystem etc. The human environment aspects usually have "high value" due to their intrinsic value in addition to others.

The second step was to describe and evaluate the magnitude of potential project impacts, measured in terms of their extent in time and space (long term/short-term), the vulnerability of the environments affected (sensitivity), the reversibility (permanent or temporary) of the impacts and the probability that the impacts will occur. The magnitude of impacts will be evaluated on a scale from 'high negative' to 'high positive'.

The third and final step was to combine 'value' (step 1) and 'magnitude of impacts' (step 2) to obtain the 'overall impact assessment' (step 3). This assessment will evaluate the importance of an impact on a scale ranging from 'very large negative' to 'very large positive'.

Environmental and Social Legislation

All relevant legislation governing ESIA in Uganda were reviewed and the compliance actions proposed. The supreme laws including the National Environment Act No.5 of 2019 and the Environmental Impact Assessment Regulations of 2020 guided the preparation of the ESIA.

Other existing national policies, laws, regulations & standards, institutional framework, Roundtable on Sustainable Palm Oil Principles & Criteria, IFAD's Social, Environmental and Climate Assessment Procedures (SECAP) with a bearing on the proposed National Oil Palm Project were reviewed to further establish requirements for compliance and thresholds within which the proposed project should be operating.

Baseline Environment

Climate: According to the 5-year District Development Plan (2015/2016 to 2019/2020), the climate of Kalungu District is almost semi-arid in areas of Lwabenge, some parts of Kyamulibwa and Kalungu sub-counties. The rainfall pattern is bimodal having two seasons with dry spells between July and August, and January to March. The months of March, April and May receive relatively heavy rainfall which is not well-distributed. The second season occurs in the months of September to December. Generally, Kalungu District is dry, with Lwabenge Sub- County being the driest.

Soils and Geology: The geology of the selected sub counties consists of Precambrian gneisses and granites. In the selected sub counties this geology manifests as lateritic soils and clays /sands. These geology types are not known to have any effects on sustainability of oil palms.

Topography: The landscape and topography of Kalungu District is generally rolling and undulating with vertical gully heads and valley bottom swamps including streams flowing to the lake and rivers. Most parts of the district are dotted with the hills.

Biological Environment

Kalungu district landscape is defined by mosaics of wetlands covering about 8% of the total land area of the district. The wetlands are largely dominated by *Cyperus papyrus* and *Phragmites australis* such as in Bukulula, Lwabenge sub county, Kyamulibwa and Lukaya Town councils. In addition to the permanent wetlands, there are widely occurring seasonal swamps mostly on privately owned land and in the valleys/lower lying areas. Most of the rest of the district herbaceous vegetation mostly in

open flat landscapes and farmlands, and seasonally flooded grasslands especially in the flood plain areas of Bukulula subcounty facing River Katonga Wetland areas; open and wooded grasslands towards the great Katonga wetland Ramsar site, and remnants of tropical forests (local forest reserves) under the management of district forest services that is Kalongo local Forest reserve (17.9 ha), Nabijoka Local Forest reserves (45.4 ha) and Bugonzi Local Forest Reserves (383.8 ha) in Kalangala, Luzira, Bugonzi and Kansambya areas. Currently, the district is dominated by plantation forests of *Eucalyptus* spp and *Pinus* spp, mostly on private lands.

Plants

The areas surveyed in Kalungu District were in areas of the grassland, farmlands, plantations, marshlands and wetland habitats. The vegetation communities in the areas surveyed had stands of trees, shrubs, herbs, Forbs, sedges and grass were recorded in these habitat types.

Grassland areas were key habitats in Lwabenge, and Bukulula sub counties on a relatively flat terrain that gently slopes towards low lying areas largely dominated by grass species interspersed with pockets of bushes and thickets.

The bushland habitats were characterized by bushes of *Acanthus pubescens*, *Solanum mauritianum*, *Solanecio angulatus*, *Eriosema glomeratum*, *Triumfetta rhomboidea*, *H. rufa* and *Imperata cylindrica*, *Microglossa pyrifolia*, *Acalypha indica* and *Alchornea cordifolia*, inter-twined with several herbaceous weedy species.

The areas of marshland and wetland habitats were characterised by grasses, herb and sedge assemblages with species such as *Phragmites australis*, *Leersia hexandra*, *Cyperus rotundus*, dominant *Cyperus papyrus* in river Katonga wetland, *Eriosema salignum*, *Aframomum angustifolium*, *Triumfetta macrophylla*, *Bridelia micrantha*, *Capparis erythrocarpos*, *Celosia trigyna* and *Phoenix reclinata*.

No natural forest reserves survive in Kalungu District, which instead has plantation forests in the local forest reserves growing *Pine* and *Eucalyptus*.

Invertebrates

Insects dominate the terrestrial and aquatic ecosystems in terms of species richness, individual abundances and biomass (Gaston, 1991). They are highly susceptible to the adverse effects of disturbances and land use changes. Butterflies and dragonflies are used as indicator taxa as their life cycles depend on various habitats which make them suitable species for assessing the biodiversity of ecosystems (Sahlen & Ekestubbe, 2004).

Butterflies and Dragonflies are the only invertebrate groups that were surveyed for, selected since they are species rich groups, they are day active and therefore easy to see and also to sample and/or capture for identification. To document the invertebrate's fauna two methods- Sweep netting and Baited traps (for butterflies only) were used. There is no publicly available survey results/data for the two invertebrate groups surveyed for this report for Kalungu district in general, which means all data presented in this report will be the first of its kind.

The objectives of the invertebrate surveys were to document the insect (Butterflies and dragonflies) species in the project area, identify their sensitive or unique habitats, identify the occurrence of species of conservation concern, identify potential impacts of the project on the species and suggestion of possible mitigation measures to be implemented to reduce impacts of the project on the species.

The invertebrate surveys were conducted in Eucalyptus woodlots. And areas of cultivation in converted wetland sections. To document the invertebrate's fauna two methods- Sweep netting and Baited traps (for butterflies only) were used.

In total 54 species of butterflies and 9 species of dragonflies were recorded from the areas surveyed. None of the species recorded are listed as of conservation concern.

Birds

Biodiversity describes the number of living organisms found in any given area. Higher numbers of living organisms (types and abundances) indicate a healthier landscape. But this can often be challenging to measure. Unlike most other living organisms, the richness (that is, different types of species) and abundance of bird species can be observed and measured by most people with some small degree of skill. Different birds occupy different habitats in different seasons and different times of the diurnal cycle. Birds are typically easy to observe with a pair of binoculars and a field guide to the local bird species.

Birds are a practical indicator of biodiversity since in healthy landscapes, seed eater, foliage grazer, insectivore, nectivore, omnivore, and carnivore birds can represent the full range of trophic levels. Changes in land use and management affect shelter, food, and habitat resources available to birds. Collectively, these characteristics make birds an excellent practical indicator to monitor and report the health of biodiversity on the property.

Birds were surveyed for using direct observations with the aid of binoculars and a field guide for East African birds. The intention of the surveys was to compile the species lists of birds occurring in selected areas of the district, to identify the existence of any species of conservation concern and to identify critical habitats for the survival and/or conservation of birds.

The surveys for birds were conducted in Bukulula, Lukaya and Lwabenge sub-counties. In total 93 species of birds were recorded from all surveys in the district. None of the species recorded is considered of conservation concern and all are fairly common widely occurring species. Some of the survey points in Bukulula Subcounty were conducted along the edges of the wetland, Papyrus wetlands are home to a number of species of conservation concern (such as the Papyrus Gonolek - listed Globally as Near Threatened and Nationally as Vulnerable). This species was however not encountered during the surveys although it may well be present in the papyrus swamps.

Mammals

Mammals are usually a significant component of the terrestrial biota for which reason they are often used as a good indicator of environmental change. They represent a conspicuous component of the biota of many places especially when they comprise of larger conspicuous species such as antelopes, buffalos, elephants, hippos and diurnal primates. In many biomes the larger proportion of the mammalian biodiversity is comprised of the medium to small sized mammals. In human impacted habitats such as in Kalungu District, the large mammals will mostly have been lost out leaving only small and medium sized species. These two groups of mammals are capable of surviving in even small fragments of natural habitats while the larger species may not be able to.

The objective of the study was to document mammal species in the project area, identify their sensitive or unique habitats, IUCN statuses of the species, identify potential impacts of the project on the species and suggestion of possible mitigation measures to be implemented to reduce impacts of the project on the species.

The surveys for mammals in Kalungu District, were conducted in a Eucalyptus woodlot and in two areas of cultivation in converted wetland areas. The approach to document the mammals used visual encounter surveys, trapping and interviews with member of the local community.

The mammal surveys in Kalungu District recorded in total 9 species mostly from interviews with members of the local community. Although Hippopotamus and Waterbucks were reported, it seems unlikely that they occur in viable populations anymore in any part of Kalungu District. The small/medium sized mammals (Stripped ground Squirrel *Xerus erythropus* and Cane rat *Thryonomys*

gregorianus) unlike the larger mammals were either sighted or evidence of the presence 9 feed signs) were seen. Hippopotamus, Sitatunga and the Spot-necked Otters are listed as threatened species – but if no wetland conversion will be intentionally done for palm oil growing, their habitats will likely remain intact with minimal impacts on them.

Potential implications for biodiversity from the proposed project

- If the proposed oil palm growing is limited to the already agricultural areas and the Sango Bay estate that was already previously designated for agriculture this project will not result in major land cover and habitat change impacting particularly forest areas.
- Increased depletion of woody biomass may result in increased pressures on the forest for fuel wood and other fuel extraction. This would have a long term impact on the current forest estate from wood biomass extraction
- The proposed project may result into further and/or total conversion or change of ephemeral habitats that have had some importance to biodiversity in the agricultural landscapes.
- Mono crops (such as what the palm oil plantations will ultimately become) have reduced biodiversity levels simply because they are a very simple structure habitat.
- Habitat specific species could be lost out as a result of irreversible habitat change.

Ecosystem Services and their Values

A number of benefits and useful resources are obtained from the ecosystems and landscapes that will be impacted by the proposed oil palm development project in the district. These benefits and resources are collectively referred to as ecosystem services. They include provisioning services, regulating services, supporting services and cultural services (USAID, 2016). The key ecosystem services generated by the proposed project impact area include provisioning services with respect to food production, water supply, provision of non-timber forest products including fuel-wood and various non-wood forest products, fibre, fish and traditional medicines. The regulating and supporting services included carbon capture and storage, habitat values, water quality and purification, pollination, water storage and recharge, flood control and maintenance of soil fertility. Cultural services on the other hand included nature-based tourism, spiritual well-being, aesthetics and research.

The ecosystem service value estimates associated with the wetlands and swamp forest systems in Bukulula, Kalungu, Kyamulibwa and Lwabenge sub-counties in Kalungu District were based on the Ministry of Water and Environment study of the economic value of the biodiversity and ecosystem services in the Lake Nabugabo Wetland Complex and Ramsar site undertaken by the ministry in 2015 (MWE, 2015). The value of ecosystem services that will be impacted by the proposed project were US\$ 162,000 for capture fisheries per year, US\$3,516,000 for wood based energy and timber in a year, US\$180,000 for non-wood/non fish wetland products, US\$ 54,000 support to livestock production, US\$ 615,000 pollination, seed dispersal and pest control, US\$5,277,000 for water storage and recharge, US\$3,768,000 for regulating water quality, US\$492,000 for flood attenuation, US\$72,000 for carbon capture and storage and US\$663,000 for nature based tourism all on an annual basis (MWE, 2015). The ESMAP will aim to maintain or increase these levels of ecosystem resilience and productivity.

Socio-economic environment

Kalungu District has 2 constituencies (Kalungu East and Kalungu West) 5 sub counties, 33 parishes and 319 villages. Kalungu District is composed of four (4) sub counties that include Bukulula, Kalungu, Kyamulibwa, and Lwabenge and three (3) Town Councils namely; Kalungu, Kyamulibwa and Lukaya. Bukulula Sub-County is one of the proposed project areas and covers

232 sq.km land area. According to the 2014 census the population of Bukulula was 43,887 people (22,404 females and 21,483 males) with a sex ratio of 95.9 and 6,724 households. It's composed of 8 civic parishes and 74 villages. The district has over 218 schools currently with 46 Nursery Schools, 134 Primary Schools, 33 Secondary Schools, 1 Tertiary institution, 2 Teachers College Schools. The land tenure system within the project area is either Freehold, Mailo or leasehold. Mailo tenure is the most dominant in the project area. It involves the holding of land in perpetuity, permits the separation of ownership of land from the ownership of developments made on land by a lawful or bona-fide occupant (generally known as Tenant).

The main economic activity in Kalungu District is agriculture followed by the service sector, trade and least is manufacturing. The district is largely dependent on agriculture (69%) which includes crop farming, livestock keeping, poultry keeping, fish farming and bee keeping. Most of the farming for livelihoods involves crop farming (95%), livestock rearing (43%) and poultry keeping (33%). Main crops that are grown are coffee, beans, cassava, sweet potatoes, bananas, maize, finger millet, sorghum, Irish potatoes and rice. Livestock kept include cattle, pigs, goats, sheep, rabbits and donkeys.

A number of benefits and useful resources are obtained from the ecosystems and landscapes that will be impacted by the proposed oil palm development project in the district. These benefits and resources are collectively referred to as ecosystem services. They include provisioning services, regulating services, supporting services and cultural services (USAID, 2016). The key ecosystem services generated by the proposed project impact area include provisioning services with respect to food production, water supply, provision of non-timber forest products including fuel-wood and various non-wood forest products, fibre, fish and traditional medicines.

The urban centres of Lukaya, Kalungu, Kyamulibwa and Mukoko have become the primary magnet for rural urban migration because of employment opportunities, business attractions, and availability of relatively better infrastructure (schools, health facilities, roads, electricity and communication). The district has three (3) Town Councils and 2 Town boards that need urgent proper physical planning to guide development.

Stakeholder engagement

During the ESIA, consultations were held with stakeholders including Kalungu District Local Government, local communities in Bukulula Sub-County, Lwabenge Sub-County and Lukaya Town Council, National Environment Management Authority, The National Oil Palm Project-Ministry of Agriculture, Animal Industry and Fisheries, Ministry of Gender, Labour and Social Development, Ministry of Works and Transport, National Agriculture Research Organisation, Wetlands Management Department and Directorate of Water Resources Management. Some of the main issues/concerns raised were impacts associated with vegetation clearance, impacts/risks accruing from heavy reliance on fertilizers during the oil palm production cycle, impact on food security, poor waste management, strict adherence to the labour and employment policies, no child will be employed in oil palm production related activities, access roads should be in line with ministry guideline general standards for roads under this category, increased land conflicts, need for capacity building for people under the project, continuous sensitization and support to small holder farmers to engage in inter cropping to promote food security.

Impact identification and mitigation

Potential environmental and social effects/risks of the project on the physical, biological, and socio-economic environment during all phases of the project were identified and analysed to determine the significance. The positive impacts and those of large negative and medium negative significance are summarized below, as well as the corresponding proposed mitigation measures.

Positive impacts

- i. Increase employment opportunities
- ii. Improved income
- iii. Improved infrastructure
- iv. Land restoration of previously unproductive areas
- v. Prevention of loss in soil fertility through intercropping
- vi. Increase in biomass
- vii. Climate regulation
- viii. Increase in vegetation cover
- ix. Project will divert people's effort away from fishing thus reducing the pressure on natural water bodies and allowing fish numbers and size to rejuvenate.
- x. The project is expected to yield archaeological materials especially project activities during excavations/ ground disturbance.
- xi. The project is expected to expose the archaeological and cultural resources in the area thereby facilitating cultural tourism and conservation.
- xii. Increase in biodiversity. The palm oil gardens may work as dispersal or movement corridors, which in itself may aid survival of some herpetofauna species.

The Table below shows the predicted major positive and negative impacts and the measures proposed to mitigate them

Negative Impact/risk	Possible mitigation measures
Impact on air quality due to greenhouse gas emissions from the construction equipment and Crude Oil Palm Mill.	Encouraging the use of biodiesel instead of diesel in project equipment and vehicles
Impact on biological resources such as loss of vegetation (including grass, shrubs, crops, pine and Eucalyptus plantations, due to site clearance for growth of oil palm resulting in decline in plant species diversity. Impact on Nabugabo Ramsar Wetland System	<ul style="list-style-type: none">▪ Supporting and encouraging deliberate re-forestation as part of the farming communities,▪ Growing of legumes as cover crops within the oil palm gardens,▪ Conservation tilling (circling) ploughing only around the crop,▪ Following the do not harm principle to the dot and slash and discourage burning totally.▪ As will be guided by the Wetlands Management Department, a buffer should be left between the small holder farmland, and the Ramsar site.▪ Regular monitoring of the biodiversity in Nabugabo Ramsar site to determine if there are any changes in species diversity as a result of the project activities.

<p>Impact on soils, water quality and hydrology:</p> <p>Poor handling, storage and disposal of waste, fertilizer use, exposure of soils for planting oil palm could result in contamination of soils and surface water. Specifically,</p> <ul style="list-style-type: none"> ▪ Organic matter enrichment of Lake Victoria and rivers around the project area. ▪ Increase in surface water runoff as a result of vegetation clearance and due to creation of drainage channels, ▪ Heavy reliance and long-term inorganic fertilizer application may have reduced the soil nitrogen, and organic carbon, altered beneficial microbes in the soil. ▪ River and lake sedimentation ▪ Decline in soil fertility and, in particular, soil organic carbon (SOC). 	<ul style="list-style-type: none"> ▪ Observance of the 200m buffer zone by farmers is emphasised and should be enforced to limit contamination. ▪ Enrichment of the buffer area through greening ▪ Spot application of fertilisers ▪ Adherence to required amounts to minimise surplus that could be washed away into neighbouring environs. ▪ The design of the Oil Palm plantations and the CPO Mill and should include proper drains and waste water treatment infrastructure.
<p>Pollution from waste: Establishment of access roads may require a sizeable work force that warrant setting up of a temporary worker's camp which may indiscriminately dispose of wastes and sewage which could lead to the spread of disease creating a potential health hazard to the residents and other settlements in the neighborhood. Domestic wastewater may also cause contamination of surface water rendering the water unsafe for use. Improper sanitation facilities may also lead to disease outbreak</p>	<ul style="list-style-type: none"> ▪ Provide adequate and gender disaggregated sanitation facilities at the temporary camp ▪ Ensure proper solid waste management by providing coded collection containers
<p>Social impacts</p>	

Impacts from noise and dust generation	<ul style="list-style-type: none"> ▪ Restrict construction activities to daytime only when noise pollution is least felt. No activities will be allowed on site beyond 7.00 pm in order to check on the noise pollution much felt at night. ▪ A code of conduct will be put in place to be followed by the workforce and avoid causing unnecessary inconvenience to the community. ▪ The workforce operating equipment that generates noise should be accorded with protective gear. ▪ Routes to be used should be clearly marked and made known to area residents ▪ Sensitization of communities about road safety ▪ Put in place clear road signs ▪ Employ competent drivers ▪ Conduct daily toolbox talks with drivers ▪ Minimize dust generation by managing haulage vehicles through a Traffic Management Plan; ▪ Monitor dust generation in the impact area and have response plans in place to address exceedance; and ▪ Pay attention to community feedback via the grievance mechanism.
Conflict is likely to occur between communities and workers working on plantations of farmers whose household labour may not be sufficient.	<ul style="list-style-type: none"> ▪ Farmers who may require extra laborers on their farm should engage area people to minimize labour requirements needed from outside the community. ▪ Farmers will collaborate with police to contain criminal activities.
Change in landuse: In Bukulula Sub County, much of the land is utilized for growing of seasonal crops like maize, beans, sweet potatoes, water melon, vegetables, coffee and bananas. In Rwabenge Sub-County, vast chunks of land dedicated to animal rearing. Introduction of oil palm growing means that farmers will have to abandon their current land use or dedicate part of it to oil palm growing.	<ul style="list-style-type: none"> ▪ Comprehensive and continuous sensitization of PAPs to allow the farmers to make informed decisions. ▪ The farmers should be encouraged to grow food crops along side palm oil.
Impact on food security and nutrition: Converting large areas currently under food crop production into oil palm farms will reduce land available for crop production and could have negative impacts on nutrition. This would contravene IFAD's main aim of improved	<ul style="list-style-type: none"> ▪ Engaging in food cropping along side oil palm growing shall be emphasized to ensure food security ▪ Clear and continuous sensitization of farmers by NOPP about the importance of food security. ▪ There should be strict adherence to the minimal threshold land requirement before recruitment of households as potential farmers.

<p>nutrition among rural communities and improved food quality, which are in tandem with SDG2, which aims to end hunger, achieve food security, improved nutrition, and promote sustainable agriculture by 2030.</p>	<ul style="list-style-type: none"> ▪ Post implementation monitoring and auditing should be conducted to establish the food security situation in the project area.
<p>Child Labour issues: Very often children participate in oil palm cultivation but receive little or no pay and are often forced to endure harsh working conditions including long hours and exposure to chemicals in form of fertilizers and pesticides.</p>	<ul style="list-style-type: none"> ▪ Clear labour and employment policies will be set and followed to the dot. ▪ No child below 18 of age will be employed in oil palm production related activities. Sensitisation should be continuous to emphasis this. ▪ Records that show the ages of their workers shall be kept by the oil palm growers. ▪ Ensure that the community and local leadership have access to and know of and report abuse using the national child abuse hotline 116.
<p>Risk associated with influx of migrant workers and social interactions</p>	<ul style="list-style-type: none"> ▪ As a general recommendation, all Contractors shall be required to develop guidelines for behavioural conduct, including penalties. ▪ Where necessary and feasible, local labour force from within the immediate communities shall be recruited to minimize housing pressures as well as, social conflicts in the Project Area. This to be done in liaison with local council leadership to identify suitable persons for employment. ▪ Workers must be sensitized on proper social behaviour and conduct with regard to community norms prior to starting work; ▪ Workers should avoid engaging in sexual relations with underage girls and married women. ▪ In case of misunderstandings between workers and the local community, use of local leadership should always be sought as a first priority in solving these issues; alternatively, the Grievance Redress Committees can be used to address grievances. Opportunities of collecting community grievances through community meetings, use of a grievance logbook and suggestion boxes. ▪ Similarly, in liaison with local leaders, contractors should prepare local communities – psychologically for the newcomers; efforts be focused on instilling attitudes of tolerance, support and understanding towards the newcomers in the local communities.

HIV/AIDS and sexually transmitted infections	<ul style="list-style-type: none"> ▪ As a contractual obligation, contractors will be required to have an HIV/AIDS policy. ▪ A comprehensive HIV/AIDs management plan shall be developed and promoted by NOPP. ▪ Engage local labour as much as possible to limit influx from outside the community ▪ Sensitize host communities to prepare for new workers ▪ All construction workers will be orientated and sensitized about responsible sexual behavior with project area communities and inherent health risks associated with HIV/AIDS and other sexually transmitted diseases. ▪ Management of social bonding at workplace. ▪ Education on HIV transmission should be included in the sensitization message delivered to potential farmers. Emphasis should be placed on existing risks and drivers of HIV transmission in the area.
Risk of increase in COVID 19 infection	<p>All farmers and other project personnel should adopt the following practices:</p> <ul style="list-style-type: none"> ▪ Wear a mask at all times ▪ Practice social distancing ▪ Frequently wash your hands with soap and water for at least 20 seconds. When soap and running water are unavailable, use an alcohol-based hand rub with at least 60% alcohol. ▪ Avoid touching your eyes, nose, or mouth with unwashed hands. ▪ Practice good respiratory etiquette, including covering coughs and sneezes. ▪ Avoid close contact with people who are sick. ▪ Stay home if sick.
Risk of accidents and occupational hazards anticipated in operation of the mill and crop management	<ul style="list-style-type: none"> ▪ Carryout intensive risk assessment to identify risk and hazards associated with project implementation at all project phases. ▪ Develop and implement a health and safety management plan ▪ Communities and schools should be sensitized on the road safety and need to keep off construction sites; ▪ Workers who will pick the fresh fruit bunches will be instructed to observe speed limits and general order while driving across sections of schools and trading centers; ▪ There will be erected speed control humps across sections of roads near the schools.

Landownership issues could emerge. Given that oil palm is a perennial monocrop hence occupies land under it for a period of above 25 year, claims on land over such a period could emerge.	<ul style="list-style-type: none"> ▪ Establish rightful land owners before enrolment of potential farmers ▪ Engage or use existing local and cultural administrative structures to resolve claims associated with inheritance in the above context.
Risk of fire outbreak	<ul style="list-style-type: none"> ▪ Zero-burning technique is a method of land clearing whereby organic matter is left to decompose naturally or used as mulch in the gardens. This could improve the fertility and reduce on the quantities of inorganic fertilizer required. Using cleared vegetation as mulch could also reduce on the run off subsequently reducing the risk soil erosion. ▪ Use of the windrow process. This is where vegetative waste is in the inter-rows for natural decomposition.

Conclusion and Recommendations

This ESIS presents identified potential negative environmental and social impacts and proposed mitigation measures for incorporation during the project design to eliminate, minimise, mitigate and offset during project implementation.

The contractor and subcontractors shall comply with the Government of Uganda's policies laws, and regulations and best international industry practice regarding Environmental, Social, and Health and Safety (ESHS) requirements.

In the event that the project is approved;

- The developer should ensure that the mitigation measures proposed in this report are implemented in order to minimize and/ or avoid the identified adverse environmental and social impacts of the proposed project;
- Proper waste management facilities and emergency preparedness/response measures must be put in place;
- The developer should also ensure that the ESMP (Table 9-2) is available to the relevant parties responsible for implementing it.
- The proposed monitoring plan should also be implemented to track the effectiveness of mitigation measures and hence further improvement of the mitigation plan. Monitoring will be used as a means of ensuring compliance with national and international standards.

To supplement the ESMP, contractors'/project management should develop the following Environmental management plans:

- Stakeholder Engagement Plan
- Waste Management Plan
- Chemicals/Fertilizer Management Plan
- Occupational Health and Safety Plan;
- HIV/AIDS Prevention Plan;
- Erosion and Sediment Control and Drainage Management Plan;

- Environmental Restoration plan;
 - Traffic Management plan
 - Biodiversity Management Plan
-
- The developer should ensure that on completion of project works, all exploited work sites are restored to as near as possible their original state and in accordance with the developed and approved restoration plans.
 - An Environmentalist, Sociologist, and Health and Safety Officer, among other staff should be recruited to monitor the implementation of the ESMP.
 - The contractor's safeguards officers should submit to the developer/Supervising Consultant monthly ESHS performance reports.
 - The developer should keep records and make annual reports to the NEMA describing how far the project conforms to the statements in the ESIS.
 - The developer should obtain any necessary permits/licenses/approval before commencement of the project.
 - Post ESIA audits works should be carried out to ascertain compliance of the project with the ESMMP, ESIA Conditions of Approval from NEMA and the environmental legal framework and related requirements Annual environmental audits are also in compliance with the National Environment Act, 2019;
 - In compliance with the National Environment Act, 2019, if the developer wishes to add any other component onto the project which was not considered under this assessment, a fresh separate Environmental and Social Impact Assessments (ESIA) should be undertaken to determine its compatibility with the immediate environment, its impacts on the environment and to identify appropriate mitigation measures for its adverse impacts. The ESIA should be conducted before the commencement of any works. The ESIAs should be conducted by qualified and registered ESIA practitioners/firms.

1. INTRODUCTION

The agricultural sector remains the backbone of the Ugandan economy. Agriculture provided 22% of national GDP and 53% of Uganda's export earnings over 2007-2011 period, and contributes a large share of the raw materials for industry. Vegetable oil consumption in Uganda mounted to about 540,000 tons in 2014, though this translated to extremely low per capita consumption rates: 8.2 kg/capita per annum compared to 21.0 kg/capita per annum in developed countries. Only half the national demand is met by net domestic vegetable oil production (i.e., total production less exports); the remainder coming from imports. The preponderant share of vegetable oil imports is accounted for by Crude Palm Oil (CPO), which is refined into vegetable oil locally by about six processors, two of which are large scale – and one of which, BIDCO Uganda Limited, is the private sector partner under the IFAD-supported Vegetable Oil Development Project (VODP). On the other hand, because of its distance from the sea, Uganda's import parity price for CPO is relatively high, so favouring local production of oil palm and oil seeds.

The Government of Uganda (GoU) under the Ministry of Agriculture, Animal industries and Fisheries (MAAIF) intends to implement the National Oil Palm Project (NOPP), a ten-year project, facilitating a Public-Private Producer-Partnership (4Ps), that was signed 2018, between the government of Uganda and the International Fund for Agricultural Development (IFAD)- the public sector. The IFAD financing includes a US\$ 75.82 million loan and a US\$ 1.21 million grant. The overarching goal of the project is an inclusive rural transformation through Oil Palm investment, with a development objective of sustainably increasing rural income through opportunities generated by the establishment of an efficient Oil Palm industry that complies with modern environmental and social standards. The NOPP will be implemented by MAAIF through the Project Management Unit (PMU), BIDCO Ugand Limited, the Private Sector and Smallholder farmers- the Producer, who together have shares in a holding company for primary processing.

The National Oil Palm Project (NOPP) will be implemented in the mainland areas located within a narrow belt (25-30 km) around Lake Victoria and surrounding the two island districts of Kalangala and Buvuma, but also areas in the western (Bundibugyo, Masindi) and north-western (Arua) parts of the country. The Project will work in geographical hubs, where a hub is defined as "an agro- climatically suitable area (not an administrative district), within a radius of 30 km around a planned or actual Crude Palm Oil (CPO) mill, and in which a minimum of 3,000 ha of Oil Palms (OP) production can be assured." It is this radial area that marks the limits of financial viability for the producers, who may be smallholders plus nucleus estate. Drawing on this model, NOPP will concentrate its activities on smallholder Oil Palm development on the following hubs:

- Buvuma Island
- Mayuge
- Masaka/Rakai
- Kalangala (Bugala and outlying islands, where it will consolidate the investments to date, but will not support an expansion in the area under OP production)
- Around Kiryandongo or in Buikwe (to be confirmed from studies).

In this regard therefore, Newplan Ltd signed a contract agreement with the MAAIF for the NOPP to undertake the Environmental and Social Impact Study for the proposed establishment of Oil Palm Plantations in Masaka Hub. The aim of the ESIA is to evaluate the environmental and social impacts of the project, and produce an Environmental and Social Impact Statement (ESIS).

1.1 The ESIA Requirement

Section 113 of the National Environment Act (NEA), 2019 requires the developer of a project set out in Schedule 5 of the Act to conduct an Environmental and Social Impact Assessment by way of scoping, prepare terms of reference for the environmental and social impact study, and undertake an environmental and social impact study.

The proposed project falls under the category 6 on agricultural investment, livestock, range management and fisheries, subsection (a) lists large scale cultivation of 20 hectares and more, as one of the projects that for which ESIA is mandatory and for which an Environmental and Social Impact Statement should be prepared and submitted by the developer to the National Environment Management Authority (NEMA) for approval.

In line with the NEA, 2019, and with the International Fund for Agricultural Development (IFAD)'s Social, Environmental and Climate Assessment Procedures (SECAP), an Environmental and Social Impact Assessment was conducted for the proposed establishment of Oil Palm Plantations in Kalungu District.

1.2 Purpose of the ESIA

The purpose of the ESIA is to identify and assess the potential environmental and social impacts of the proposed project and propose mitigation measures and management actions to avoid or minimize the negative impacts.

The ESIA findings shall guide the project design and well as decision maker's/project management to understand the environmental and social consequences of the proposed project to facilitate the protection, restoration and enhancement of the environment and socioeconomic setting of the project area.

1.3 Specific objectives of the ESIA

1. To identify and assess the potential environmental and social impacts of the proposed project on the natural resource base and livelihoods of communities in the target areas;
2. Establish the need for physical and/or economic displacement resulting from the proposed establishment of the hubs;
3. Identify options to mitigate potential negative impacts and improve expected positive impacts, in order to improve environmental and social sustainability of the Project as a whole;
4. Recommend key opportunities to influence NOPP towards environmental sustainability and climate smart development.
5. Prepare a comprehensive and implementable Environmental and Social Mitigation, Monitoring and Management Plan and provide associated costs for the recommended mitigation measures and actions;
6. Prepare an Environmental and Social Impact Statement for submission to the National Environment Management Authority and IFAD's Executive Board;
7. Contribute to the environmental and social design of the project.

1.4 Scope of ESIA

The scope of the ESIA was guided by provisions in the second schedule of the National Environment (Environmental and Social Assessment) Regulations ,2020 for Uganda and the approved terms of reference for the study (See letter of approval of ToR, attached as Appendix 1).

The ESIA considered the potential environmental and social effects of the project on the physical, biological, and socio-economic environment during all phases of the project due to project activities, including from accidents, malfunctions and unplanned events that could occur. It also considered any environmental and social effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out.

1.5 Terms of Reference (ToR)

A scoping exercise was undertaken to identify the important issues to be examined in detail during the ESIA, and thus to develop the terms of reference (TOR) for the ESIA. Subsequently, the TOR were approved by NEMA after consultation with lead agencies (Appendix 1).

1.6 Approach to the ESIA

The ESIA preparation process was be guided by the EIA guidelines for Uganda of 1997 that outline the EIA process (Figure 1-1). This process was further guided by the IFAD Social, Environment and Climate Action Procedures (SECAP).

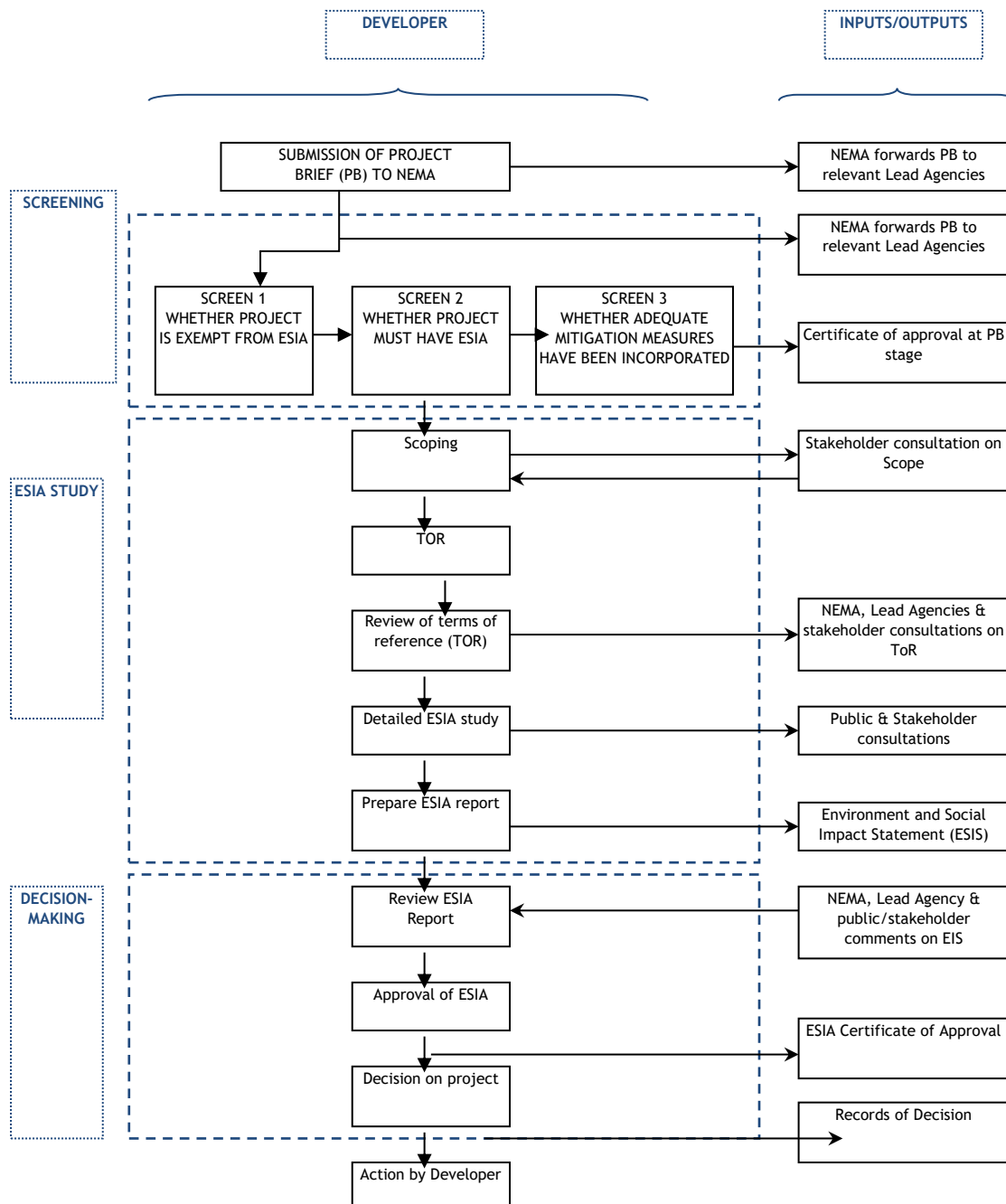


Figure 1-1: ESIA process in Uganda

1.7 ESIA Structure

This report has been prepared in guidance with Schedule 5 of the National Environment (Environmental and Social Assessment) Regulations, 2020. The ESIS contain a cover page showing title, location of proposed development, name, address & contact information of the developer and date of submission. A declaration sheet signed by all environmental practitioners who undertook the study, acknowledgement, acronyms and subsequent chapters as follows;

- Executive Summary- Non-Technical Summary of the ESIS
- Introduction- Background of the Project, Scope and justification, description of the proposed project, including the name, purpose and nature of the project.
- ESIA Methodology- Procedures and methods used during data collection

- Review of relevant national laws and international policies and safeguard guidelines: A description of the manner in which the proposed project and its location conform to existing laws and standards governing such projects.
- Description of the Proposed Project- Outlines the design of the project and any other project related components, including the activities that shall be undertaken and a description of the major material inputs to be used during construction or development and operation of the project. The projected costs of the project evidenced by a certificate of valuation of the capital investment of the project issued by a qualified and registered valuer.
- Analysis of project alternatives: An evaluation of project alternatives, including a zero or no-project alternative in terms of project location, project design or technologies to be used, and a justification for selecting the chosen option.
- Environmental and Socio-Economic Conditions of the Baseline Environment: Description of baseline conditions of the physical, biological and socio-economic environment of the project area, including results of relevant studies and other geophysical and geotechnical studies.
- Stakeholder Engagement and Public Consultations: Evidence of stakeholder consultation, including how the stakeholders were involved.
- Identification and Assessment of Impacts: An assessment of potential environmental, health, social, economic and cultural impacts of the project and their severity, and the proposed mitigation measures to be taken during the pre-construction, construction, operational and decommissioning phases of the project.
- Environmental and Social Management Plan: Details environmental management and monitoring plan incorporating a climate adaptation and mitigation plan.
- References: A list detailing the sources used for the descriptions and assessments included in environmental and social impact statement;
- Appendices;

2. PROJECT DESCRIPTION

2.1 Basic Project Data

The Kalangala investment has demonstrated that oil palm can be grown in areas of Uganda where conditions are suitable, and that smallholders are viable and credible partners. The model of nucleus estate and smallholder development has provided for knowledge transfer and confirmed that national production and value addition is the way forward for the industry countrywide.

Table 2—1: Basic Project Data

Project Title	Consultancy Services to Conduct an Environmental and Social Impact Assessment (ESIA) for the Proposed Establishment of Oil Palm Plantations in Masaka Hub.
Report Title	Environmental and Social Impact Statement (ESIS) for the Proposed Establishment of Oil Palm Plantations in Kalungu District
Project Duration	10 years (2018/19 – 2017/28)
Estimated Project Cost- Masaka Hub (Covering Kalungu, Masaka and Kyotera District.	USD 180 Billion
Estimated Cost-for Kalungu District Component	USD 22.2 Billion
Employer	The Republic of Uganda represented by Ministry of Agriculture, Animal industry and Fisheries (MAAIF) for the National Oil Palm Project
Consultant	NEWPLAN Ltd

2.2 Project Objective

The overall goal of the National Oil Palm Project is inclusive rural transformation through oil palm cultivation in Uganda. To achieve this goal, the Project's specific development objective is to sustainably increase rural incomes through the establishment of an efficient oil palm industry that complies with modern environmental and social standards.

The outcomes that would make the achievement of the development objective possible are summarized below, together with the related Project components and action areas:

- Scaling-up investment in smallholder oil palm development
- Livelihood's diversification and resilience
- Oil Palm sector development framework

2.3 Nature of the Project

The project is of a nature described under schedule 5 (6a) of the National Environmental Act, 2019; for which an ESIA is mandatory.

According to IFAD, an environmental and social risk can be categorized as High, Substantial, Moderate or Low. The risk categories are determined by: the nature and sensitivity of the project area; the significance and magnitude of potential impacts; and the cumulative and induced impacts. For projects with several components or subprojects, the highest risk category of all components or subprojects will be considered the project's overall risk category. The choice of risk category must be clearly justified, with any potentially significant impacts in the project that are classified as High Risk clearly identified, described and discussed in the ESIS.

The selection of an environmental and social category (Table 3-1) depends on the project context since the extent of potential impacts is a function of the surrounding natural and sociocultural environment. This is particularly true for IFAD-supported projects, which tend to be implemented in marginal and ecologically fragile areas. Sensitive areas include: protected areas such as national parks, wildlife, nature reserves and biosphere reserves; areas of global significance for biodiversity conservation; natural and critical habitats dependent on endangered species; natural forests; wetlands; coastal ecosystems, including coral reefs and mangrove swamps; small island ecosystems; areas vulnerable to climate change and variability; lands highly susceptible to landslides, erosion and other forms of land degradation; rural communities vulnerable to social changes and exposure to health risks; and areas with cultural resources of historical, religious, archaeological or other significance.

Projects located in sensitive areas may be considered High Risk or Substantial Risk, and should involve extensive community consultation because of their potentially serious negative impacts on ecosystems and community members' health and livelihoods.

Table 2—2: Environmental and Social Risk categories

Category	Environmental and social risk level
High	<p>High Risk: This classification considers whether the potential risks and impacts associated with a project have most or all of the following characteristics:</p> <ul style="list-style-type: none"> - Result in sensitive, irreversible or unprecedented significant risks and impacts (for example, resulting in loss of major natural habitat or conversion of wetlands); - Result in risks and impacts that are significant in magnitude and/or spatial extent (large geographical area or size of the population likely to be affected); - Have significant risks and impacts that affect an area much broader than the sites or facilities subject to physical interventions; - Result in significant adverse cumulative or transboundary impacts; - High probability of serious adverse effects to human health and/or the environment (e.g. due to accidents, toxic waste disposal); -

Category	Environmental and social risk level
	<ul style="list-style-type: none"> - Risks and potential impacts are not readily remedied by preventive actions or mitigation measures; - The area affected is of high value and sensitivity, for example, sensitive and valuable ecosystems and habitats (legally protected and internationally recognized areas of high biodiversity value), lands or rights of indigenous peoples and other vulnerable minorities, intensive or complex involuntary resettlement or land acquisition, or impacts on cultural heritage; - There are significant concerns that the project's adverse social impacts and associated mitigation measures may give rise to significant social conflict, harm, significant risks or impacts on human security; - There is a history of unrest in the project area or significant concerns regarding the activities of security forces; - The project is being developed in a legal or regulatory environment where there is significant uncertainty or conflict regarding the jurisdiction of competing agencies, legislation or regulations do not adequately address the risks and impacts of complex projects, changes to applicable legislation are being made, or enforcement is weak; - There are significant concerns related to the capacity, commitment and track record of project stakeholders in relation to engagement, or there are several external factors that could have a significant impact on the project's environmental or social performance, or outcomes. - Economic or physical displacement (e.g. land, potable water and water for other uses), or physical resettlement of more than 100 households or businesses, and/or significant loss of assets or access to resources (i.e. over 15 per cent reduction in a farmer's or community's assets); - Conversion and loss of physical cultural resources.
Substantial	<p>Substantial Risk: A project should be classified as Substantial Risk when it is not as complex as a High-Risk project and its environmental and social scale is not in such a sensitive area, but may pose significant risks and impacts if not adequately managed. These potential risks and impacts have most or all of the following characteristics:</p> <ul style="list-style-type: none"> - They are mostly temporary, predictable or reversible, and the nature of the project makes it possible to entirely avoid or reverse them; - There are concerns that the project's adverse social impacts and associated mitigation measures may give rise to a limited degree of social conflict, harm or impacts on human security; - The geographical area and size of the population likely to be affected are medium to large; - There is some potential for cumulative or transboundary impacts, but they would be less severe and more readily avoided or mitigated than in a High-Risk project; - There is medium to low probability of serious adverse effects to human health or the environment (e.g. due to accidents, toxic waste disposal), and there are known and reliable mechanisms to prevent or minimize such incidents; - The project's effects on areas of high value or sensitivity are expected to be lower than for High-Risk projects;

Category	Environmental and social risk level
	<ul style="list-style-type: none"> - Mitigation or compensation measures may be designed more easily and be more reliable than those of High-Risk projects; - The project is being developed in a legal or regulatory environment where there is uncertainty or conflict regarding the jurisdictions of competing agencies, legislation or regulations do not adequately address the risks and impacts of complex projects, changes to applicable legislation are being made, or enforcement is weak; - The past experience of the borrower/recipient/partner and implementing agencies in developing complex projects is limited, and their track records regarding environmental and social issues suggest that some concerns can be addressed through implementation support; - There are concerns about capacity and experience in managing stakeholder engagement, but these can be readily addressed through implementation support. <p>Additionally, a project may be classified as Substantial Risk when it finances one or more of the following activities:</p> <ul style="list-style-type: none"> - Development of a large-scale agro-processing facility; - Aquaculture or Mari culture of 25 to 49 hectares on one site; - Construction or operation causing an increase in traffic on rural roads; - Economic or physical displacement (e.g. land, potable water, water for other uses), or physical resettlement of 20-100 households or businesses, or a 10 to 15 per cent reduction in a farmer' or community's assets. <p>If the environmental and social screening exercise shows that the risks and impacts are significant, the project category will be upgraded to High Risk.</p>
Moderate	<p>Moderate Risk: A project should be classified as Moderate Risk when potential adverse risks and impacts on human populations or the environment are not likely to be significant. This may be because the project is not complex or large, does not involve activities with high potential for harming people or the environment, and is located away from environmentally or socially sensitive areas. The potential risks and impacts are:</p> <ul style="list-style-type: none"> - Predictable and expected to be temporary or reversible; - Low in magnitude; - Site-specific, without the likelihood of impacts beyond the project life cycle; - Low probability of serious adverse effects to human health or the environment (e.g. they do not involve the use or disposal of toxic materials, or routine safety precautions are expected to be sufficient to prevent accidents); - The project's risks and impacts can be easily mitigated in a predictable manner. <p>Additionally, a project is classified as Moderate Risk when it finances one or more of the following activities:</p> <ul style="list-style-type: none"> - Aquaculture or mariculture of less than 25 hectares on one site.
Low	<p>Low Risk: A project should be classified as Low Risk if it will have negligible or no environmental or social implications. Examples include:</p> <ul style="list-style-type: none"> - Technical assistance grants for agricultural research and training; - Research; - Extensions;

Category	Environmental and social risk level
	<ul style="list-style-type: none"> - Health; - Nutrition; - Education; and - Capacity- and institution building.

Nabugabo is an ecologically sensitive area and an important stop-over/destination for migratory bird species both to the south and palearctic. There are also quite a number of forest reserves in the project area. This ecosystem is in close proximity to project identified farmers. However, the project's effects on this ecosystem are expected to be lower than those of High-Risk projects, shall be temporary and reversible hence putting this project in the category of **Substantial risk**.

Based on the Kalangala experience and in order to develop a modern oil palm industry, Government of Uganda will promote a private sector-driven model that promotes smallholder oil palm production and modern crude palm oil (CPO) processing with qualified private sector partners. The selected private sector partners will be responsible for providing inputs to smallholders (seedlings together with fertiliser and other inputs) along with technical knowledge for crop establishment and maintenance, as well as on Environment, health and safety (EHS) practices, in line with RSPO social and environmental principles. Smallholders Oil Palm Growers will be supported to run their holdings as a business implementing best known industry practices. NOPP will interface with the private sector partner(s) on behalf of smallholder OP growers and support the development of infrastructure, the provision of technical services and financing support, within a sustainable collaboration framework for the long-term sustainability of the industry.

2.4 Project Justification

NOPP will draw on the experience from the oil palm investment in Kalangala under the Vegetable Oil Development Project (VODP) and VODP2 and build on the opportunities generated by a growing domestic palm oil industry to drive the transformation of the economies of those areas that are suitable for oil palm production, and thus sustainably improve the incomes and livelihoods of rural communities. NOPP will facilitate the establishment of a vertically integrated value-chain with strong backward and forward linkages between the oil palm growers and primary processors. The arrangement will reduce the market risks faced by smallholders, such as the lack of a guaranteed market, the limited access to quality inputs and technical know-how, and the limited availability of credit for medium and long-term investment. Under this arrangement, the private sector partner will provide seedlings to Oil Palm (OP) smallholder farmers and will purchase their Fresh Fruit Bunches (FFBs) at a transparently negotiated price. Government will develop the necessary public infrastructure and provide the growers with financial, technical and organizational support; and the smallholder growers will grow oil palm as a business, adopting the key practices required to guarantee the productivity of their oil palm plantation while ensuring conformity to environmental standards, and will deliver the FFBs to the CPO mills. IFAD's role will be to broker this 4P (Public, Private, Producer, Partnership) relationship and build trust amongst the partners. As evidenced under VODP/VODP2, the model is expected to create new economic opportunities for smallholder producers and others in the local communities; to result in increased incomes and improved livelihoods for them; and to catalyze broad-based rural economic growth. To ensure the target community's livelihoods approach is fully covered, awareness creation on appropriate utilization of income at household level to ensure it

supports the most important needs of different household members i.e. food, health, education, shelter clothing, etc will be crucial.

Finally, by supporting the development of an enabling policy and institutional framework to govern the oil palm sector, NOPP will enable GoU to establish the conditions for the sustainable and equitable development of the oil palm sector, and the further extension of the benefits already achieved under VODP and VODP2 and those to be achieved under NOPP to other rural communities that offer the scope for oil palm production.



2.1 Location of the Project

2.1.1 General Project Location

Only limited parts of the country have conditions proven to be suitable for growing oil palm, where rainfall, soil and temperature conditions are favorable. These include the mainland areas located in a narrow belt (25-30 km) along Lake Victoria and surrounding the two island districts of Kalangala and Buvuma as seen in Figure 4-1. The Project will work in a limited number of geographical hubs, where a hub is defined as an agro-climatically suitable area (not an administrative district), within a radius of 30 km around a planned or actual CPO mill, and in which a minimum of 3,000 ha of OP production can be assured. It is this radial area that marks the limits of financial viability for the producers, who may be smallholders only or, in the case of Buvuma and Kalangala, smallholders plus nucleus estate. Drawing on this model, NOPP will concentrate its activities on smallholder OP development in the following hubs: Buvuma Island, Mayuge, Masaka/Rakai and Kalangala (Bugala and outlying islands, where it will consolidate the investments to date, but will not support an expansion in the area under OP production); as well as a fourth hub, not yet definitively selected, which may be located around Kiryandongo, subject to confirmation of its suitability for production, or in Buikwe. Project investment in any of these, or other hubs, will be dependent on confirmation of the agro-ecological suitability of the area, the identification of smallholder producers with 3,000 ha to dedicate to OP production within the 30km radius; and a firm commitment by the private sector to invest in the CPO mill to serve the local supply.



MAAIF

Ministry of Agriculture
Animal Industry and Fisheries

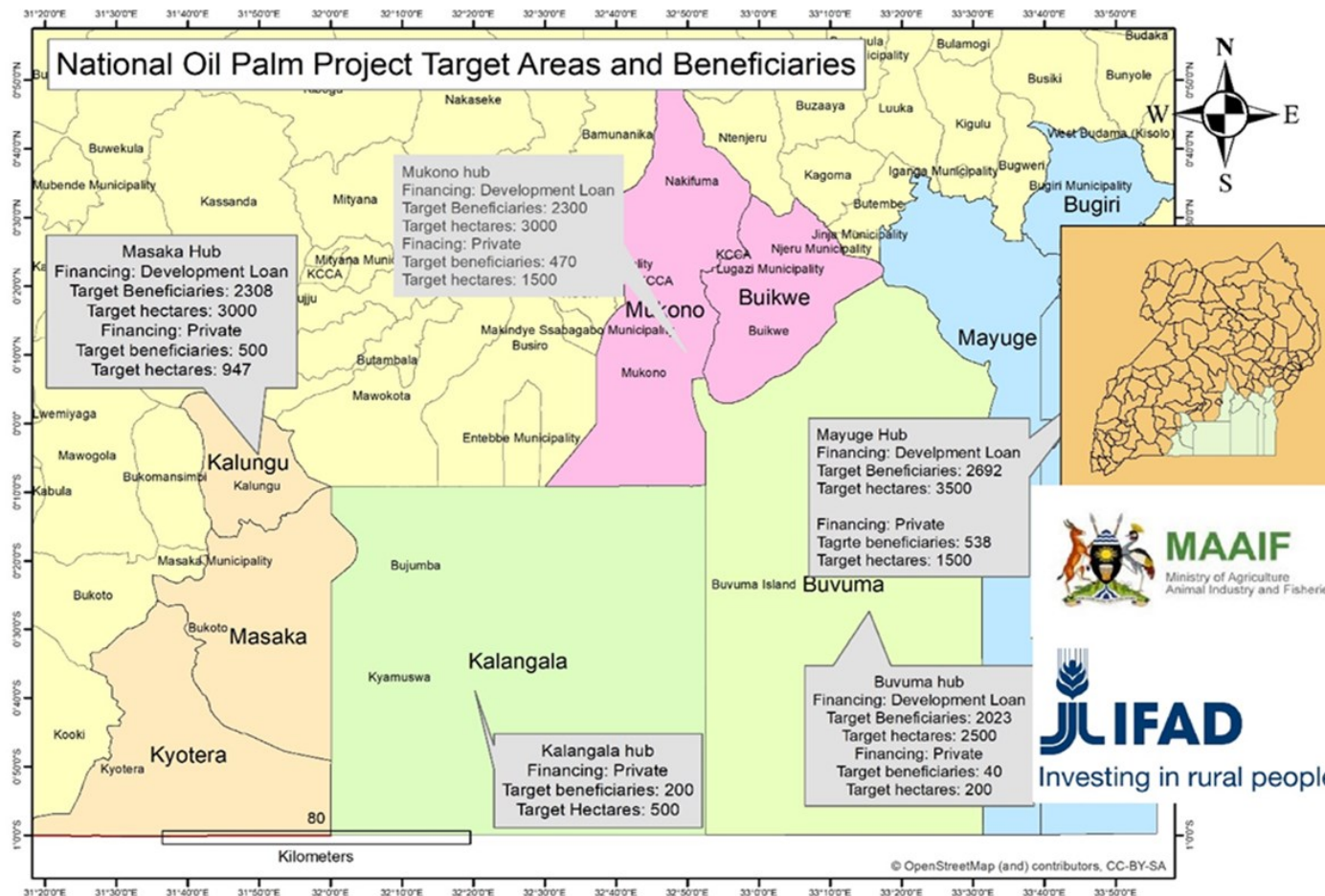


Figure 2-1: Identified Hubs for the NOPP

2.1.2 Proposed site for development

Kalungu is one of the 3 districts selected to implement the Oil Palm Project within the Masaka Hub area. The district was carved from Masaka District, found in the central part of Uganda, named after the main town of the district Kalungu where the headquarters are located. Kalungu District is bordered by Gomba District to the north, Butambala District to the northeast, Mpigi District to the east, Masaka to the south and Bukomansimbi district to the west. The chief town of the district, Kalungu is located 21 Km by road, northwest of Masaka, the largest metropolitan area in the sub-region.

The proposed project is targeting to develop small holder farms in Bukulula and Lwabenge Subcounties and Lukaya Town Council.

Table 4-2 below provides the tentative locations of few smallholder farmer locations, and Figure 4-2 provided the map with some of the proposed project locations in Kalungu District.

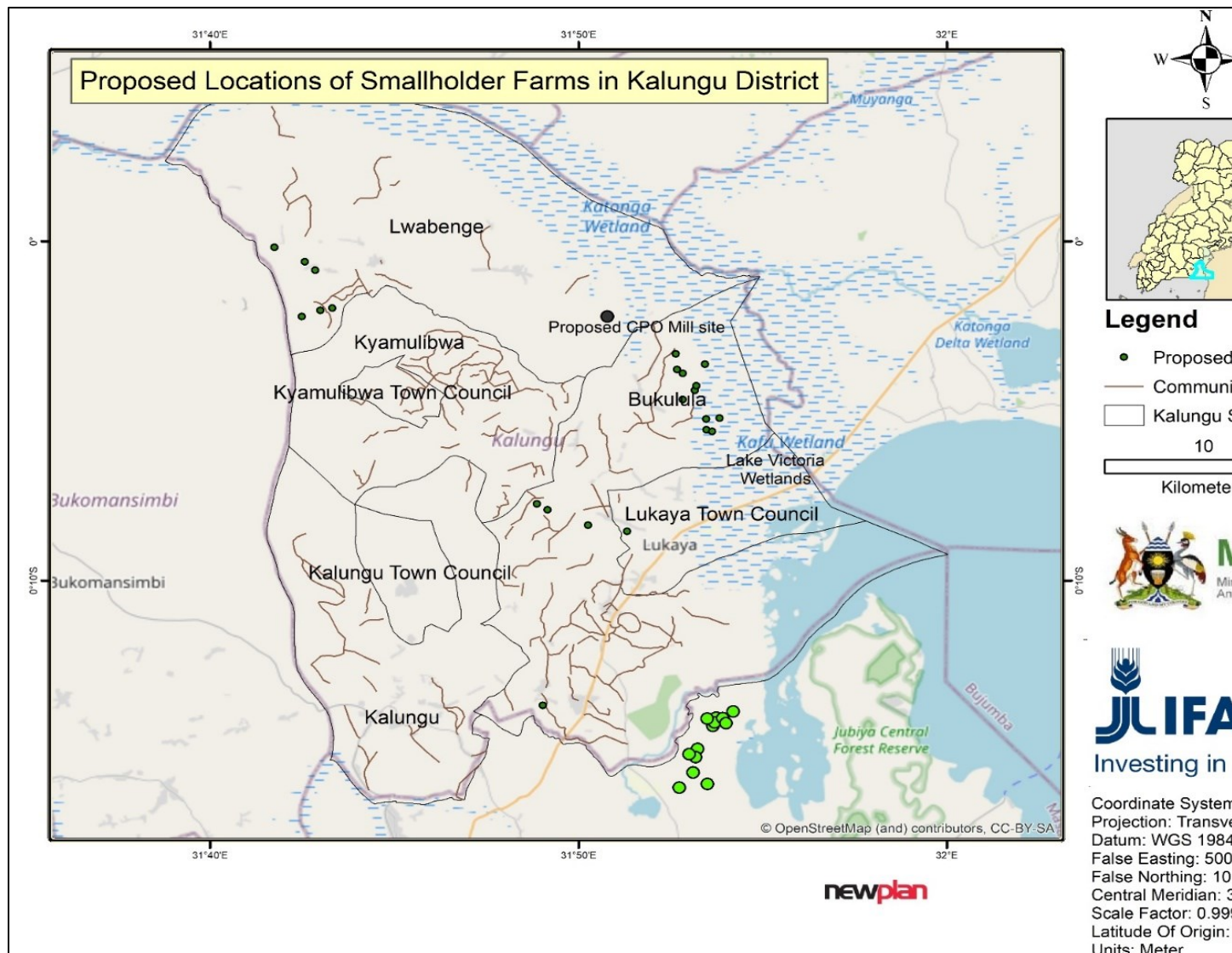


Figure 2-3: Proposed locations of small holder farms in Kalungu District

Table 2—4 provides the site coordinates for the proposed small holder farms in Kalungu District.

Table 2—3 Coordinates of small holder farm sites in Kanungu District

FID	Subcounty	Parish	Village	X	Y
0	Bukulula	Mukoko	Kalangala	375343	9977052
1	Bukulula	Mukoko	Kalangala	375363	9976985
2	Bukulula	Mukoko	Kalangala	375395	9976999
3	Bukulula	Mukoko	Kalangala	375378	9977055
4	Bukulula	Mukoko	Kalangala	375386	9977079
5	Bukulula	Mukoko	Kalangala	375384	9977077
6	Bukulula	Mukoko	Kalangala	375385	9977074
7	Bukulula	Mukoko	Kalangala	375388	9977078
8	Bukulula	Mukoko	Kalangala	376189	9977300
9	Bukulula	Mukoko	Kalangala	376197	9977280
10	Bukulula	Mukoko	Kalangala	376230	9977288
11	Bukulula	Mukoko	Kalangala	376225	9977321
12	Bukulula	Mukoko	Kalangala	376634	9977533
13	Bukulula	Mukoko	Kalangala	376653	9977545
14	Bukulula	Mukoko	Kalangala	376650	9977575
15	Bukulula	Mukoko	Kalangala	376633	9977577
16	Bukulula	Mukoko	Kalangala	377046	9978682
17	Bukulula	Mukoko	Kalangala	377096	9978646
18	Bukulula	Mukoko	Kalangala	377099	9978614
19	Bukulula	Mukoko	Kalangala	377123	9978618
20	Bukulula	Mukoko	Kalangala	377123	9978649
21	Bukulula	Mukoko	Kalangala	377125	9978611
22	Bukulula	Mukoko	Kalangala	377114	9978608
23	Bukulula	Mukoko	Kalangala	377115	9978570
24	Bukulula	Mukoko	Kalangala	377138	9978577
25	Bukulula	Mukoko	Kalangala	377107	9978559
26	Bukulula	Mukoko	Kalangala	377086	9978541
27	Bukulula	Mukoko	Kalangala	377115	9978570
28	Bukulula	Mukoko	Kalangala	377106	9978485
29	Bukulula	Mukoko	Kalangala	377164	9978500
30	Bukulula	Mukoko	Kalangala	375101	9976654
31	Bukulula	Mukoko	Kalangala	374965	9976477
32	Bukulula	Mukoko	Kalangala	375074	9977005
33	Bukulula	Mukoko	Kalangala	374820	9976928
34	Bukulula	Mukoko	Kalangala	375627	9977152
35	Bukulula	Mukoko	Kalangala	375722	9976863
36	Bukulula	Mukoko	Kalangala	375900	9976932

37	Bukulula	Mukoko	Kalangala	375625	9977157
38	Bukulula	Mukoko	Kalangala	375636	9977110
39	Bukulula	Mukoko	Kalangala	375842	9977175
40	Bukulula	Mukoko	Kalangala	376119	9977291
41	Bukulula	Mukoko	Kalangala	376136	9977188
42	Bukulula	Mukoko	Kalangala	376236	9977213
43	Bukulula	Mukoko	Kalangala	376189	9977074
44	Bukulula	Mukoko	Kalangala	376197	9977280
45	Bukulula	Mukoko	Kalangala	376230	9977288
46	Bukulula	Bugonza	Kasamba	375343	9977052
47	Bukulula	Mukoko	Kalangala	375055	9979026
48	Bukulula	Mukoko	Kalangala	375044	9979099
49	Bukulula	Mukoko	Kalangala	375108	9979111
50	Bukulula	Mukoko	Kalangala	375115	9979156
51	Bukulula	Mukoko	Kalangala	375281	9979120
52	Bukulula	Mukoko	Kalangala	375298	9979052
53	Bukulula	Mukoko	Kalangala	375758	9978247
54	Bukulula	Mukoko	Kalangala	375888	9978198
55	Bukulula	Mukoko	Kalangala	375908	9978291
56	Bukulula	Mukoko	Kalangala	375765	9978308
57	Bukulula	Mukoko	Kalangala	375717	9978262
58	Bukulula	Mukoko	Kalangala	375726	9978312
59	Bukulula	Mukoko	Kalangala	375623	9978309
60	Bukulula	Mukoko	Kalangala	375623	9978273
61	Bukulula	Mukoko	Kalangala	376664	9979596
62	Bukulula	Mukoko	Kalangala	376516	9979640
63	Bukulula	Mukoko	Kalangala	376500	9979628
64	Bukulula	Mukoko	Kalangala	376507	9979570
65	Bukulula	Mukoko	Kalangala	376495	9979465
66	Bukulula	Mukoko	Kalangala	376370	9979574
67	Bukulula	Mukoko	Kalangala	376313	9979567
68	Bukulula	Mukoko	Kalangala	376315	9979544
69	Bukulula	Mukoko	Kalangala	376238	9979512
70	Bukulula	Mukoko	Kalangala	376191	9979300
71	Bukulula	Mukoko	Kalangala	376278	9979279
72	Bukulula	Mukoko	Kalangala	377057	9979650
73	Bukulula	Mukoko	Kalangala	377030	9979572
74	Bukulula	Mukoko	Kalangala	377065	9979555
75	Bukulula	Mukoko	Kalangala	377055	9979532
76	Bukulula	Mukoko	Kalangala	377071	9979522

77	Bukulula	Mukoko	Kalangala	377073	9979513
78	Bukulula	Mukoko	Kalangala	377118	9979522
79	Bukulula	Mukoko	Kalangala	377136	9979615
80	Bukulula	Mukoko	Kalangala	377136	9979615
81	Bukulula	Mukoko	Kalangala	377127	9979558
82	Bukulula	Mukoko	Kalangala	377173	9979547
83	Bukulula	Mukoko	Kalangala	377179	9979558
84	Bukulula	Mukoko	Kalangala	377225	9979552
85	Bukulula	Mukoko	Kalangala	377232	9979574
86	Bukulula	Mukoko	Kalangala	377232	9979574
87	Bukulula	Mukoko	Kalangala	377225	9979552
88	Bukulula	Mukoko	Kalangala	377284	9979527
89	Bukulula	Mukoko	Kalangala	377295	997955
90	Bukulula	Mukoko	Kalangala	374529	9978822
91	Bukulula	Mukoko	Kalangala	374561	9978904
92	Bukulula	Mukoko	Kalangala	374633	9978846
93	Bukulula	Mukoko	Kalangala	374595	9978786
94	Bukulula	Mukoko	Bugonzi	376612	9979711
95	Bukulula	Mukoko	Bugonzi	376598	9979710
96	Bukulula	Mukoko	Bugonzi	376584	9979772
97	Bukulula	Mukoko	Bugonzi	376705	9979747
98	Bukulula	Mukoko	Bugonzi	376691	9979800
99	Bukulula	Mukoko	Bugonzi	376020	9979432
100	Bukulula	Mukoko	Bugonzi	375958	9979426
101	Bukulula	Mukoko	Bugonzi	375974	9979485
102	Bukulula	Mukoko	Bugonzi	376023	9979519
103	Bukulula	Mukoko	Kalangala	375625	9978169
104	Bukulula	Mukoko	Kalangala	375666	9978170
105	Bukulula	Mukoko	Kalangala	375684	9978163
106	Bukulula	Mukoko	Kalangala	375583	9978199
107	Bukulula	Mukoko	Bugonzi	376577	9979803
108	Bukulula	Mukoko	Bugonzi	376568	9979833
109	Bukulula	Mukoko	Bugonzi	376628	9979853
110	Bukulula	Mukoko	Bugonzi	376678	9979858
111	Bukulula	Mukoko	Bugonzi	376691	9979818
112	Bukulula	Mukoko	Kalangala	377142	9979358
113	Bukulula	Mukoko	Kalangala	377167	9979389
114	Bukulula	Mukoko	Kalangala	377193	9979392
115	Bukulula	Mukoko	Kalangala	377199	9979349
116	Bukulula	Mukoko	Kalangala	377353	9979119

117	Bukulula	Mukoko	Kalangala	377340	9979053
118	Bukulula	Mukoko	Kalangala	377339	9979109
119	Bukulula	Mukoko	Kalangala	377349	9979091
120	Bukulula	Mukoko	Kalangala	377322	9979055
121	Bukulula	Mukoko	Kalangala	377325	9978815
122	Bukulula	Mukoko	Kalangala	377279	9978799
123	Bukulula	Mukoko	Kalangala	377289	9978746
124	Bukulula	Mukoko	Kalangala	377288	9978713
125	Bukulula	Mukoko	Kalangala	377350	9978723
126	Bukulula	Mukoko	Kalangala	377281	9978712
127	Bukulula	Mukoko	Kalangala	377283	9978744
128	Bukulula	Mukoko	Kalangala	377177	9978741
129	Bukulula	Mukoko	Kalangala	377158	9978653
130	Bukulula	Mukoko	Kalangala	376882	9978390
131	Bukulula	Mukoko	Kalangala	376982	9978362
132	Bukulula	Mukoko	Kalangala	376999	9978396
133	Bukulula	Mukoko	Kalangala	376884	9978426
134	Bukulula	Mukoko	Kalangala	377095	9978349
135	Bukulula	Mukoko	Kalangala	377175	9978390
136	Bukulula	Mukoko	Kalangala	377174	9978447
137	Bukulula	Mukoko	Kalangala	377103	9978431
138	Bukulula	Mukoko	Kalangala	376953	9977854
139	Bukulula	Mukoko	Kalangala	376898	9977908
140	Bukulula	Mukoko	Kalangala	376856	9977818
141	Bukulula	Mukoko	Kalangala	376938	9977846
142	Bukulula	Mukoko	Kalangala	376795	9977880
143	Bukulula	Mukoko	Kalangala	328840	9977651
144	Bukulula	Mukoko	Kalangala	375959	9977650
145	Bukulula	Mukoko	Kalangala	375987	9977652
146	Bukulula	Mukoko	Kalangala	375981	9977785
147	Bukulula	Mukoko	Kalangala	376021	9977779

2.2 Design and Engineering

At project design stage four specific hubs have been identified: Kalangala, where oil palm production both on the nuclear estate and smallholder growers' plots is already under way, and two CPO mills process the FFBs; Buvuma, where a nuclear estate, smallholder production and a CPO mill are all planned; Mayuge (part or all of the district and possibly part of Bugiri and/or Namayingo Districts); and Masaka/Rakai.

2.3 Project Phases and Duration

NOPP support for smallholder OP production will take place in 'hubs', defined in terms of agro-ecological and environmental suitability and commercial viability. Each hub will constitute a minimum production area of 3,000 ha within a 30 km radius of a CPO mill site. The location of three hubs has already been defined, while that of the fourth will be decided upon during implementation. It will be important to ensure that as soon as production of FFBs comes on stream there is a CPO mill to supply (and conversely, for the private sector partner, ensuring that there is adequate supply to justify the substantial investment of the CPO mill). Therefore, synchronizing the establishment of the mill with the planting of the oil palm will be critical. In all hubs, the aim will be to ensure that a minimum of 3,000 ha are planted within a 2-year period. The experience of labour groups to ensure the rapid planting of contiguous blocks will be used in NOPP.

2.4 Project Cost

The estimated investment cost of the Kalungu component of the project is Uganda Shillings ... 22, 200,000,000 (Twenty-two billion, two hundred million Uganda Shillings Only).

2.5 Overview of Oil Palm growth conditions

Oil palm is a perennial tree crop with a 25-year cycle, compared with the other oilseed crops that are annual crops. Oil palm trees need suitable rainfall, soil and temperature conditions. The crop requires two-stage processing: within 24 hours of harvest, the crop must be milled by a primary processing facility into Crude Palm Oil (CPO); CPO is storable and can be shipped to a refinery, where it is processed into edible oil and soap. Palm oil can be produced at a much lower cost than the other vegetable oils, although the long time required for the trees to reach maturity (4-5 years from initial planting) make start-up cost a barrier to entry. Because of its high yields and the small areas needed for planting, it is financially rewarding for smallholders and can provide steady monthly cash income, if a modern CPO mill is nearby for processing the crop.

Optimal growth of oil palm trees is dependent on several factors, with the amount of annual rainfall and its distribution being key. Limited parts of Uganda have ideal conditions for growing oil palm, and the most suitable areas are located in: (i) a narrow belt (25-30 km) along Lake Victoria on the mainland areas and nearby islands; (ii) some areas in the far western part of the country (Bundibugyo) and the far north-west (Arua) where rainfall is high; and (iii) some parts of parts of Masindi and Kibaale with higher rainfall may also be suitable, along with some areas to the west of Lake Kyoga with wetter soils (to be confirmed). To attain full potential, high yielding drought and disease tolerant varieties must be planted and appropriately maintained. Preliminary assessments suggest there may be up to 100,000 ha of area suitable to oil palm development in Uganda. However, although some research trials of oil palm were conducted by Food and Agricultural Organisation (FAO) from the 1970s onwards– trials which confirmed that some areas of the country were suitable for the crop, until the 2000s there was no commercial production of the crop in Uganda.

2.6 Project Components/facilities

2.6.1 Crude Palm Oil Mill

Oil Palms are transported to the mills in trucks. After having been weighed at the weighbridge, these bunches are unloaded at the receiving dock containing hoppers provided for this purpose. This primary material then undergoes some processing: sterilization, stripping, washing, mixing, extraction, clarification, finishing, defibration and palm kernel production.

2.6.2 Oil Palm Nursey

To achieve the desired project size, many variables will need to be in place. One of the key variables is the availability of quality planting material. Proper coordination is required between the project and seed breeders in order to secure the volume of material required. In addition, the clearing of land and the preparation of various other materials and consumables will need careful coordination in order to meet the optimal schedule.

The rate of planting will escalate in subsequent years. The first few years will afford management time to fully understand the soil conditions, the production and growth rates of the oil palms, and to provide appropriate training to employees. The initial years will also enable the government to optimize logistics and the supply chain to ensure reliable supplies.

2.6.3 Nucleus Farm

Project investment will be dependent on confirmation of the agro-ecological suitability of the area. Smallholder producers identified, will be provided with oil palm seedlings from the nursery for planting. The project has a target of a 3,000-ha nucleus farm dedicated to OP production to serve a CPO mill that is proposed to be located in the nearby Masaka District.

The development of oil palm plantations, which frequently cover tens of square kilometers involves land clearing, road and drainage network construction, and sometimes earthworks such as terracing on undulating areas. Oil palm growers usually apply large amounts of commercial fertilizer which presents a risk for environmental pollution. The use of agrochemicals such as fertilizers and pesticides negatively affect aquatic ecosystem and hydrological functions especially when not managed optimally.

2.6.4 Oil Palm Processing

2.6.4.1 Planting

Commercial oil palm establishments use tenera variety (hybrid), which is obtained from Costa Rica and Benin. The seeds are germinated in well drained fertile soils and later transferred to nursery bags at 4-5 small leaf stage. After 8 months in the nursery, the seedlings are ready to be transplanted to the field. During the nursery stage insect pests such as ants, armyworms, bagworms, aphids, thrips, mites, grasshoppers and mealybugs should be monitored and controlled.

The field where the seedlings are to be planted should be well cleared and it is recommended to establish leguminous cover plants which help to prevent soil erosion and surface run-off, improve soil structure and palm root development, increase the response to mineral fertilizer in later years, and reduce the danger of micronutrient deficiencies.

2.6.4.2 Nutrient requirements

Oil palm can be classified as a heavy feeder crop, which implies that relatively large amounts of nutrients are required by the crop for optimum growth and yield production. In order to increase productivity of oil palm fruit bunches per unit area, fertilizers are applied at various stages. At the nursery, in each bag of soil, fertilizers are applied such as NPK, borax, potash, sulphate of ammonia. In the field, fertilizers such as muriate of potash (MOP), kersirite, dolmax, rock phosphate and compound NPK fertilizers are applied, with the type and amount determined by the crop year since establishment. It is important to note that not all nutrients added to the soil as fertilizers are taken up by the growing palm. Residues (NO_3 , PO_4) may remain in the soil and end up in surface waters through storm water runoff or are leached out of the soil into groundwater. Therefore, fertilizer amounts need to be determined based on soil nutrient status and crop requirements (Comte et al. 2012).

2.6.4.3 Pests and diseases

Pests and diseases pose a significant threat to oil palm cultivation. The crop yield can decline severely when infected by pests and diseases that damage the trees. Major pests known in oil palm plantation are defoliators, which include bagworms (*Metisa plana* and *Pteroma pendula*), caterpillars (*Darna* spp. and *Setora nitens*), moths and Rhinoceros beetles (Barthel et al. 2018). To suppress pest attacks, the application of bio pesticides and biological control methods are favored by sustaining the predators and parasitoids as well as pheromone trapping

The major diseases of oil palm include vascular wilt, bud and spear rot, fusarium wilt, red ring disease and basal stem rot disease. Fusarium wilt and basal stem rot, caused by the fungus ganoderma, are the most serious diseases of oil palm (Maluin et al. 2020). Ganoderma produces enzymes that degrade the oil palm tissue and affect the infected oil palm xylem thus causing serious problems to the distribution of water and other nutrients to the top of the palm tree. Ganoderma infection is well defined by its lesion in the stem. The cross section of infected palm stem shows that the lesion appears as a light brown area of rotting tissue with a distinctive irregularly shaped darker band at the borders of this area. The infected tissue becomes an ashen-grey powdery and if the palm remains standing, the infected trunk rapidly becomes hollow. The disease can be controlled using fungicides and cultural control such as heaping soil at infected tree trunk, isolating infected tree trunks using trenches, among other methods.

2.6.4.4 Weeding

Weeding in mature oil palm plantation involves removal of unwanted weeds from the ground cover by manual clearing with a machete. Removed weeds are allowed to gradually decay or rot. However, ring weeding around the tree can be done using herbicides, which potentially increases the risk of environmental pollution.

2.6.4.5 Harvesting

The oil palm produces fresh fruit bunches (FFB) which are harvested at intervals that are ideally 7 to 10 days in duration throughout the economic life of the palm. In order to maximize the oil extraction rate and ensure optimum oil quality, stringent harvesting standards are practiced (including paying particular attention to the ripeness of fruits, the implementation of regular harvesting rounds and handling the fruits with minimum bruising) (Barthel et al. 2018). Harvesting

oil palm is very labour intensive. The harvesters use long poles with sharp knives at the end. The collection process can either be manual, using wheelbarrows or mechanized by using a small tractor. In order to maximize oil yields per hectare, it is important to harvest FFB at the right time. Otherwise, the FFB delivered to the mill could be under- or over-ripe, leading to a reduced oil extraction rate (Barthel et al. 2018).

2.7 Small holder/out grower farms

The Project will support poor and vulnerable households, smallholder oil palm growers and others in the communities located within the hubs. The principal targeting mechanisms will include, setting a 2-ha upper limit per household for the area of oil palm to be eligible for Project financing. Overall, an estimated 30,800 households or 154,000 individuals will directly benefit from the NOPP activities. Of these, over 11,000 households will benefit as smallholder oil palm growers, and the other 19,800 from the alternative economic livelihoods and/or the mitigation of social risk activities – though both these activities will be open to oil palm growers too. Many more people are expected to gain employment from the smallholder growers.

2.8 Labour force details

Poor and vulnerable households will be directly targeted by NOPP investments in oil palm production and in alternative economic opportunities and mitigation of social risks. Overall, an estimated 30,800 households will directly benefit from these NOPP activities, without considering the sensitization activities aimed at whole communities. On the basis of an average household size of 5, these figures translate to 154,000 individuals. Of these, over 11,000 households will benefit as smallholder OP growers; and a total of 23,700 households are expected to benefit from the Alternative Economic Livelihoods activities, out of which 19,300 will be additional, non-OP growing households. A total of almost 8,100 households will benefit from the mitigation of social risk (household mentoring) activities: these will include not only OP growers and non-OP growers, but also workers in the nucleus estates.

2.9 Energy sources

All equipment that will be used on site are to be run by petrol or diesel. At early stages of the project, energy demands will be high but as it progresses, the demand will reduce and normalize. Fuel consumption cannot yet be estimated satisfactorily because a large amount of data is not yet known at this stage of the project such as, the type of mobile or stationary engine, the total number of vehicles and equipment,

2.10 Water sources

Theoretically, all the water needed for processing and consumption needs will be obtained from Lake Victoria and in areas far away from the lake, water will be abstracted from underground sources. The boreholes will have to meet certain requirements for the process, namely low silicate rate, drinking water should be free of heavy metals as well as bacteriological parameters.

Water consumption in plantations will be reduced through reusing of treated waste water from the mill as water supply.

2.11 Project Land Requirements

In the Masaka Hub, the project targets establishment of 3,000 ha of smallholder oil palm plantations. The Kalungu component of the project is expected to contribute not less than 500ha of smallholder oil palm plantations.

2.12 Project Execution and Activities

2.12.1 Pre-construction phase

Design studies

The overall project design has already been developed by Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) and the International Fund for Agricultural Development (IFAD). However, smaller technical designs for infrastructure including for farm access roads, fertiliser stores, proposed housing and office block are yet to be undertaken.

Recruitment

Before the start of the construction phase, the contractors, and workforce will need to be recruited to carry out the construction works. At the peak of the works, it is expected that up to 500 people will be employed by the project.

Project employment will be consistent with the Employment Act 2006 and the IFC Performance Standard 2: Labour and Working conditions.

2.12.2 Construction phase

The construction phase of the project will involve transportation of construction materials and machinery to the proposed site clearance, excavation and casting of concrete according to design considerations. These activities will be carried out under the supervision of a qualified Civil Engineer contracted by NOPP. Construction materials used in this phase will include concrete, steel bars, bricks, roofing material. The construction phase will also involve leveling off the ground, excavation, and casting of concrete for columns and their foundations. Also demarcating different plantation blocks and construction of access roads.

2.12.3 Operation phase

The operation phase of the NOPP will majorly involve growing of Oil Palms alongside manufacturing of Crude Palm Oil at the mill that will then be transported to the existing palm oil refinery plant in Jinja.

3. ESIA METHODOLOGY

3.1 Introduction

Several methods were utilized during the ESIA, and they included;

- i. Literature review,
- ii. Stakeholder consultations
- iii. Onsite baseline data collection that involved identification of sensitive receptors, baseline data collection and analysis- biodiversity assessment, archaeology and cultural heritage assessment, measurement of noise and air quality, socio-economic survey, hydrology assessment,
- iv. Prediction and analysis of environmental impacts resulting from the proposed development, and proposing appropriate mitigation measures.
- v. Development of an Environment Management and Monitoring Plan for implementation by MAAIF.

The various methods utilized during the ESIA are detailed below:

3.2 Document and literature review

Review of literature and secondary baseline data including area infrastructure, planned lay out of the proposed site infrastructure, planned works, area land use, sensitive ecosystems, socio-economic aspects, environmental, social, and health and safety legislation and standards was undertaken by all ESIA team members.

A number of documents were reviewed and these included the following:

- The final design report for the NOPP
- District information (Kalungu District Development Plan),
- District statistics on population, health, literacy and poverty levels
- Uganda National Population and Housing census 2014
- The world bank ESF 2017
- National Environment Act 2019
- National Environment (Environment and Social Assessment) Regulations 2020
- The distribution and diversity of amphibian fauna of Lake Nabugabo and surrounding areas.
- Lake Nabugabo Wetlands System Ramsar Site Handbook
- Herpetofaunal diversity and community structure at Lake Nabugabo and surrounding Ramsar area wetlands
- Conservation of Biodiversity in the Sango Bay Area, Southern Uganda.
- A compilation of Scientific Information on Nabugabo Ramsar Site, Uganda.

Other general publications reviewed include:

- Oil palm and biodiversity. A situation analysis by the IUCN Oil Palm Task Force, Gland, Switzerland.
- Field guides to the fauna of East Africa including but not limited to 1) A Photographic Guide to Snakes, other reptiles and amphibians of East Africa, and 2) A field guide to

the reptiles of East Africa and 3) Field Guide to Birds of East Africa. Some of these guides show some known fauna distribution in each of the East African Countries and Uganda in particular.

- IUCN 2020 Red List of threatened Species data base was also reviewed for species encountered in the project areas. The IUCN Red List determines the level of threat that is applicable to all species, and has become a world standard.
- National Red List for Uganda by Wildlife Conservation Society 2016. Taxa addressed in this publication include Mammals, Birds, Reptiles, Amphibians, Butterflies, and Dragonflies.

3.3 Stakeholder Consultation

Stakeholder consultation and disclosure are key elements of engagement and essential for success of development projects. As part of the environment and social impact assessment process, stakeholder consultation was undertaken with government ministries; district local governments, some affected sub counties and directly affected communities. Other stakeholders identified during the ESIA were added to those to be consulted.

During the ESIA, a stakeholder analysis was undertaken to establish their roles throughout project implementation and how they will be engaged.

The aim of these consultations was to identify and capture environmental and social concerns and views of the stakeholders at an early stage so that appropriate mitigations are incorporated in the project design as well as during project implementation.

3.3.1 Analysis of Stakeholders

Three steps were undertaken during stakeholder analysis and these were redefined during the ESIA. These steps include identification of stakeholders; delineation of their interests; and designing an engagement plan.

3.3.1.1 Stakeholders Identification

Identification of stakeholder groups started with investigating specific threat and opportunity factors and developing a list of key stakeholders associated with each. This was based on some key questions below:

- Who will the project benefit/ affect?
- Who are key players in development and implementation of the project?
- What key resources will be impacted?
- Who is most dependent on resources likely to be affected?
- Who possesses claims on resources to be affected – including legal jurisdiction and customary use?
- Are several government sectors and ministry departments involved?
- Are there national and/or international bodies involved either as funding agencies or because of specific laws or treaties?
- Which agencies license certain aspects or resources to be affected (forestry, wetlands, wildlife areas)?

- Are there major events or trends currently affecting the stakeholders (e.g. development initiatives, migration, population growth)?

3.3.1.2 Interests, Influence & Importance of Stakeholders

To assess influence and importance of each stakeholder and potential impact of the project upon each stakeholder, key issues investigated include:

- Who is directly responsible for decisions on issues important to the project?
- Who holds positions of responsibility in interested organizations?
- Who is influential in the project area?
- Who will be affected by the project?
- Who will promote/support the project, provided that they are involved?
- Who will obstruct/hinder the project if they are not involved?
- Which cultural institutions exist in the project areas?

3.3.1.3 Engagement of Stakeholders

Finally, the third step was to determine how to involve different stakeholders identified. It was evident that different stakeholders were to be engaged in different ways at the various stages of the project, from gathering and giving information, to consultation and dialogue.

3.3.2 Approach to consultation

The following techniques were used to conduct consultations:

- a. Individual interviews;
- b. Focus group meetings with specific focus groups selected with reference to the project objectives at the local level (e.g., local communities, Clan and cultural leaders, religious institution leaders and vulnerable groups such as Women, Children, Disabled, Elderly,);
- c. Public meetings; and
- d. Workshops.

Public consultation and information disclosure will be a continuous process throughout the project implementation phases. A consultation log will be developed to document the process and results of consultations.

3.4 Analysis of project alternatives

The assessment of alternatives was based primarily on the suitability of the alternatives in the various. Factors considered during the evaluation were:

- Technical suitability (Suitable Climate and Soil for Palm Oil);
- Environmental considerations (potential benefits and adverse effects);
- Social considerations (potential impact on the people living within and around the Project area);
- Economic viability of implementation of the alternative

3.5 Environmental and Social Baseline Studies

3.5.1 Vegetation survey

3.5.1.1 Document and Literature Review

The vegetation specialist reviewed the project inception report, available baseline information from studies previously conducted in Kalangala District, the relevant national policy, legal, regulatory, and institutional framework, the World Bank Environmental and Social Framework, the Roundtable on Sustainable Palm Oil (RSPO) Principles and Criteria for Sustainable Palm Oil Production, Uganda National Population and Housing Census 2014, and Kalungu District Natural Resources Departmental reports on environment, and Kalangala Oil Palm Out grower Trust documents on production costs, and revenues.

3.5.1.2 Data collection methods

The field survey was conducted in February and July 2022 to collect site-specific information on habitat, species presence, and vegetation community assemblages. Global Positioning System (GPS) Garmin set at Datum WGS 1984, was used to record the geographical coordinates of the survey locations (Start, along, and End of the drains) (See Google map and Way points). The vegetation specialist undertook studies within the specified points of interest, this was both random and purpose due to the modifications of the landscape; and photographs were taken and notes made.

Sensitivity of habitats was assessed from the presence of i) threatened taxa in accordance with IUCN and WCS conservation assessment protocol, ii) rarity, iii) endemism; the presence of iv) fragile watersheds, v) steep slopes, and vi) riparian areas.

Generally, a random sampling method was used to establish sampling points, while community access roads were considered as transects with at least 100m off the track for edge effects and vegetation differentiation. Nested rectangular plots of fixed area (25m x 50m), were established in plantations, farmlands/bushlands and grassland areas, while 1mx1m plots were established for grass sampling mostly in open grassland areas (Figure 1). Purposive sampling was used along wetland areas, since these were intermittent and overlapping within farmlands. GPS points were captured for each site and species recorded, presence of disturbances, signs of usability and presences or absence of species of conservation concern (based on IUCN Red list of threatened species) including invasive species were also studied.

3.5.2 Fauna survey

3.5.2.1 Invertebrates

Sweep netting

An established transect line was walked at constant pace, recording all the butterfly species seen on wings. Individuals that were difficult to identify on wings were taken and stored for further processing at Makerere University Museum. Opportunistic observations were included to help build the species list of the entire ecosystem.

Baited traps

Traps (20 in number) baited with fermenting banana were set along a transect line in strategic places like shaded areas. The traps were checked once in the morning. Specimens were identified and released; only specimens with difficult identification were collected for further processing.

Each of the butterfly species were assigned to one of the ecological categories as described by Davenport (1996). The major categories considered included forest dependent species (F), forest edge/woodland species (f), open habitat species (O), widespread species (W), migratory species (M), and wetland species (S). All the records were reviewed under IUCN for their conservation status.

Dragonflies Survey methods

Adult dragonflies were sampled using sweep nets. Voucher specimens were collected and preserved for further laboratory identification. Whenever possible, photographs of individuals were taken as colors often fade on storage. Particular attention was given to the local habitat where the species was found.

3.5.2.2 Avifauna Survey

Counting birds is best done by standard methods (see, for example, Bibby et al, 2000, Pomeroy 1992 and many others). Birds being mobile, they were sampled in habitats but within the 500 meters' radius by use of avifauna survey methods below;

i. Timed Species Counts

Timed Species Counts (TSCs) were used to assess the relative abundance of birds within the survey sites, the method gives the researcher the opportunity to flush out all observable species. TSCs are good for quick assessment of species richness and abundance of an area and are thus good for inventorying areas in environmental assessments (Pomeroy & Dranzoa, 1997; Freeman et al, 2003).

This method involved developing a species list in which all species positively identified were listed in the order seen or heard within a period of an hour, but for this survey 30 minutes at each point were used. The observer walked around the survey point in a radius of 100 meters flushing out shy and cryptic birds. The species that were recorded between 0-5, 5-10, 10-15, 15-20, 20-25 and 25-30 minutes were given scores of 6, 5, 4, 3, 2 and 1 respectively (Pomeroy 1992). TSC is good for quick assessment of species richness and abundance of an area and is thus good for inventorying areas in environmental assessments.

It involves the researcher looking for vantage points without any obstructions and recording all the birds heard and seen with the help of binoculars.

Field species identifications were done with the help of a reference i.e. "Field guide to the birds of East Africa" by Stevenson and Fanshawe (2002).

The TSCs were supplemented with opportunistic observations; for example, if a bird was seen before or after making a transect count, and in the same habitat as the transect, then it would be recorded as present. GPS coordinates were recorded to precisely geo-reference the survey sites.

3.5.2.3 *Mammal Survey*

Visual Encounter Surveys (VESs)

VESs involved walking along transects searching for surface-active species of medium sized and large mammals. This method involves looking out for indirect signs of mammalian presence such as scat, foot prints and burrows or roosts in case of bats. Visual encounter survey method is commonly used to determine the species richness of an area, to compile a species list and to estimate relative abundances of species within an assemblage.

Trapping

This involves laying Sherman live traps in the direct impact zone, to assess presence and abundance of small mammalian fauna in the project area. Traps will be baited with a mixture of g-nut paste, cassava flour and silver fish. Traps will be set in the mornings checked in the afternoon and re-baited, then checked the following morning and re-baited before being retrieved in the afternoon. All small mammals captured will be anaesthetized, identified, their photos and GPS points taken before being released back into the environment.

Local interviews

These involved interviewing the local community members' familiar with the areas of study about sighted mammal species and it was after eliciting their consented participation in the same.

3.5.2.4 *Herpetofauna survey*

Local Consultations

Local consultations were undertaken during the survey. Residents of the local community found in the field were informally interviewed to establish which herpetofauna species occur in the project areas. This was mainly to establish the presence of medium sized and large herpetofauna in their respective areas. Also, during community meeting interactions, presence of some herpetofauna species was pointed out by the participants.

Use of scientifically tested and approved methods

Several methods are available for studying herpetofauna and they vary with habitat type. The time available for conducting the study also dictate the type of method to use. Herpetofauna in the project area was surveyed using a combination of scientifically tested methods as described by Heyer et al, (1994); Fellers and Freel, (1995); Halliday, (1996); and Olson, et al, (1997). The methods included:

i. **Visual Encounter Surveys (VES):** The method involves moving through a habitat watching out for, and recording surface-active herpetofauna species. VES was complimented by visual searches, by examining under logs, leaf litter, in vegetation, and crevices. Species encountered were recorded and where possible photographed.

ii. **Audio Encounter Surveys (AES):** This method uses the species-specific calls / vocalizations / sounds / advertising calls made by breeding males. The identity of the amphibian species heard calling and their numbers were counted and recorded.

iii. **Dip netting:** Using a dip net, ponds, pools, and streams and other water collection points were dip netted. Adult amphibians and tadpoles encountered were also recorded.

iv **Opportunistic Encounters:** Herpetofauna species encountered opportunistically while moving in the project area were also recorded.

The methods were used within 500metre radius of the different sampling points and were only undertaken during the day and evenings up to 8:00pm.

Iv Identification and IUCN Red listing: Reptiles were identified using (Schjötz, 1975, 1999; Stewart, 1967) while amphibians were identified using Channing and Howell (2006) and information was collected on relative species abundance, distribution and richness. Data analysis was done by 1) compiling Species checklist, 2) determining the species conservation status using IUCN 2019 published Red List of threatened species as well as use of the 2016 National Red List for Uganda published by Wildlife Conservation Society.

Herpetofauna composition of the Project area in Kalungu

Project area	Subcounty	Areas/site surveyed
Kikoota Village (is 3-4km from Katonga wetland	Lwabenge Subcounty	2
Katonga Wetland	Lwabenge Subcounty	3
Kalangala village, Kulubya Village, Bulingo Landing Site and Birinzi Village	Bukulula Subcounty	8

In each of these village a number of sites were visited, belonging to different intending farmers.

3.5.2.5 Aquatic biota surveys

The study was conducted to achieve the following objectives;

- To document the species composition and relative abundance of fish, zooplankton, phytoplankton and macro invertebrates in the aquatic ecosystems located within the project area.
- To describe the conservation status of the fish species in the area.
- To identify the likely project impacts (both positive and negative) and come up with best mitigation measures to alleviate the negative ones in regard to the riparian aquatic ecosystems.
- To come up with recommendations for safe project operations.

Materials and Methods

Unique ecological sites were selected for this survey and the phytoplankton, zooplankton, macro-invertebrates/benthos and fish data were collected. The sampling sites were geo-referenced (Table 3-1).

Table 3—1 . Geo-referenced positions of the sampling sites

Site ID	Coordinates
R. Churwe/Namwanzi	36M 0372539, 9973212
Bulingo landing	36M 0377388, 9979269
Katinda R.	36M 0375109, 9976661

Water sampling

Phytoplankton

Water samples for laboratory analyses were collected in duplicates, treated and delivered as recommended. Water samples for phytoplankton species identification were collected using a water sampler and a sub-sample of 20 ml was fixed in 0.7% Lugol's solution and 97 % (absolute) ethanol (Wetzel & Likens, 2000). In the laboratory, samples were examined under an inverted microscope and phytoplankton were identified to species level using standard techniques (APHA, 1998) and total cell counts made.

Zooplankton

Water samples for zooplanktons species were also collected using a water sampler in three replicate hauls and combined to make a composite sample. A sub-sample of 1000 ml was filtered using cellulose acetate membrane filters (45 µm mesh size) and residues preserved in 50 % ethanol in separate sample bottles. In the laboratory, samples were examined under a stereo microscope and zooplanktons were identified to species level using identification keys and total cell counts made using a Sedgwick rafter cell.

Benthic fauna

The Ekman-Birge-grab 15x15x15cm was used to get samples of the benthic fauna from the water bed. The samples were cleaned using benthic net (0.5 mm mesh size) and preserved in 50% ethanol for later analysis in the laboratory. In the laboratory, samples were examined under dissecting microscope and the organisms were identified to family level.

Fish data

Fish data was collected by applying a number of methods

- i. Personal observation was made at the water surface, catches from the local fishermen and fish species in nearby markets.
- ii. Fisher folks and riparian communities were interviewed. Effectiveness of this method was improved by use of pictorial presentation of the various fish species known to exist in Uganda, which enabled the respondents to identify the species they usually came across.
- iii. Experimental fishing was done using scoop nets, baited minnow traps and baited hooks. Where possible experimental gillnets were used.

3.5.3 Expected Outputs from Ecological/Biological Surveys

The key expected outputs from the biological surveys included the following;

- Checklists for species occurrence
- A clear idea of spatial occurrence of the species in the different taxa
- An indication of relative abundance of species in the different taxa
- An updated vegetation map based on ground truthed data
- Maps of occurrence of the different taxa
- Lists of endangered species that will have been recorded in different areas for the different taxa
- Identification of critical habitats for the different taxa
- Anticipated impacts on the flora and fauna, recommended mitigation measures, monitoring indicators and monitoring resources.

3.5.4 Agronomy Assessment

A combination of approaches to data collection were used in the estimation of key baseline agronomic service values during the ESIA. The assessment involved obtaining agronomic services from the proposed project impact area, followed by key informant interviews and focus group discussions of the level of household consumption of the said services.

3.5.5 Economic Valuation Assessment

A combination of approaches to data collection were used in the estimation of key baseline ecosystem service values during the ESIA. It involved an initial participatory ranking of the key ecosystem services people will obtain from the proposed project impact area, followed by key informant interviews and focus group discussions of the level of household consumption of the said services. Priority ecosystem service values were then imputed through desk reviews of recent valuation studies in the area.

3.5.6 Geology and Soils Assessment

Geology and soil characteristics including type, texture, etc. were studied using secondary information. Impacts of the project on the soils of the project area were assessed and mitigation measures and monitoring plans proposed for any adverse impacts.

3.5.7 Hydrology and Topography Assessment

The methods for the hydrology study focused on providing the following inputs into the ESIA report;

- Results of surface water quality analyses including pH, conductivity, turbidity, Total Dissolved Solids, Total Suspended Solids, nitrates, Ammonia, BOD, COD, grease, etc. to obtain baseline data against which future monitoring of water quality will be based.
- A comparison of water quality analysis results with national standards for portable water quality.
- Potential impacts of the project on the hydrological dynamics in the area,
- Any changes in sediment concentrations in receiving waters caused by the implementation of project activities;
- Programmes to manage water surfaces including monitoring plans for surface water quality;
- Mitigation measures and monitoring plan for any adverse hydrological impacts.

Analysis of the topographic characteristics of the proposed project areas was done to obtain information that is likely to affect oil palm plantation establishment as well as drainage, nutrient leaching and erosion. The topographic baseline data collection was done during site visits and involved landscape characterization through visual observations. The altitude and geographic coordinates were recorded using Global Positioning satellite (System) (GPS). Secondary data was obtained from literature provided by district officials.

3.5.8 Noise and Air Quality Assessment

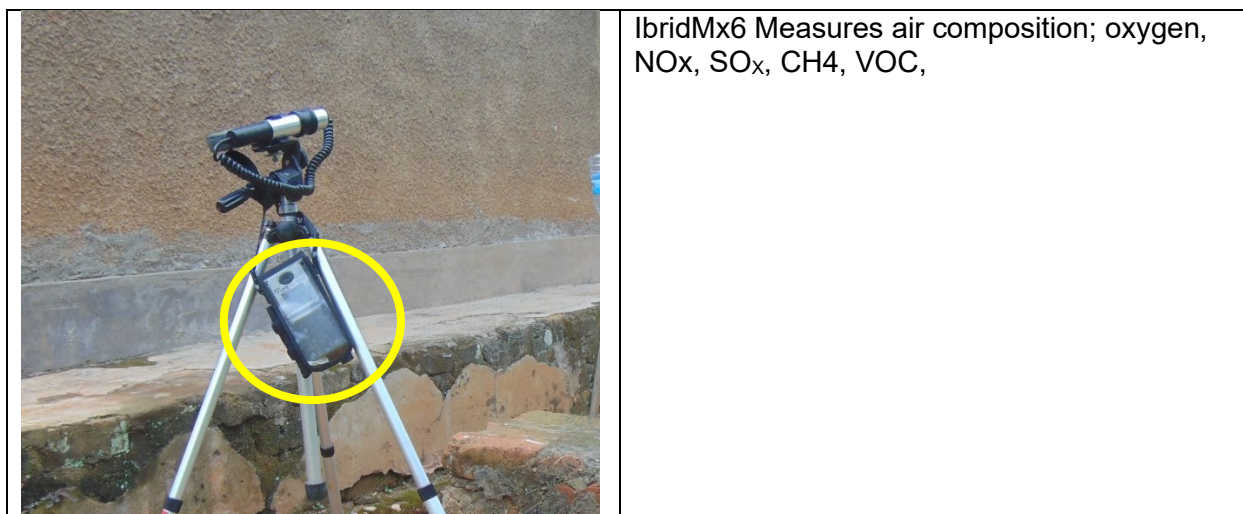
3.5.8.1 Air quality measurement

Baseline measurement of noise and air quality was carried out on 21st- 27th February 2022.

Table 3—2 shows the list of equipment that was used for the air quality survey in the project area.

Table 3—3: Equipment used to Measure Air Quality

Equipment	Purpose
 <p>GPS for taking GPS coordinates for all locations where air quality samples were obtained</p>	 <p>Camera for taking photos relevant to the study</p>
 <p>MultiRAE meter Measures air composition; oxygen, VOC, H₂S, LEL, and CO</p>	 <p>Casella Microdust Pro Particulate matter assessment was done with the help of Casella Cell 712. It measures particulate matter of a range from PM_{2.5-10}, concentrations were measured</p>



Procedure for air quality surveys

For gaseous emissions.

- 1) The equipment was powered on and left in measuring mode for the first two minutes to allow zeroing and self-calibration. This was followed by ten minutes of measurement to allow digital readings to stabilize before they could be recorded.
- 2) Measurements were conducted at each of the selected points to determine whether there would be any gaseous emissions detected.
- 3) Values for H₂S, VOC, CO, O₂, NO, NO₂, SO₂, CH₄, LEL were noted.

For particulate matter.

- 4) The equipment was allowed for two minutes for zeroing down and after it captured the samples for five minutes with an interval of 10 seconds.
- 5) For every sampled point (station), a GPS coordinate was noted

Benchmarking

A benchmarking study was undertaken in Kalangala district where oil palm is currently grown and factories for processing exist and results recorded in Table 3-4. During the benchmarking study, the following approach was used for data collection

- i. Observation of oil palm production activities that generate gaseous emissions and particulate matter.
- ii. Sampling of air quality parameters at different selected points within the mill and its environs.

Table 3—4: Airquality measurements taken at Kalangala Oil Palm Project for bench marking

Point	Gaseous Components									Particulate matter		GPS Coordinates (UTM 36M WGS 1984.)	
	SO2 ppm	NO2 ppm	NO ppm	CO ppm	CH4 % Vol	Oxy %	LEL %	H ₂ S ppm	VOC ppm	PM 2.5/ µg/m ³	PM 10/ µg/m ³	X	Y
Nema Draft Ambient Air Standards	0.5	0.2	0.2	60	-		25		6	25	50		
WHO/IFC Air Quality Standards	0.5	0.2	0.2							25	50		
Administration Office	0	0	0	0	0	21.0	0	0	0.0	Ave-10 Max-21	Ave-9 Max-13	405667	9964952
CPO Mill	0	0.4	0.2	0	0	19.0	0	0	2.3	Ave-24 Max-76	Ave-28 Max-97	405656	9964976
Generator	0	0.5	0.1	0	0	19.0	0	0	4	Ave-14 Max-112	Ave-23 Max-65	405651	9964867
Wastewater treatment ponds	0.2	0.3	0.1	0	0	19.0	0	0	0	Ave-10 Max-31	Ave-0 Max-0	405370	9964943
Community at the landing site	0	0	0	0	0	21.1	0	0	0	Ave-23 Max-124	Ave-45 Max-213	405343	9964251
Along one of the access roads within the project area	0	0	0	0	0	21.1	0	0	0	Ave-136 Max-211	Ave-215 Max-333	405416	9964476

3.5.8.2 Noise measurement

Noise was measured on weighting scale A (hence dBA units) using an Extech HD 600 Data logging Sound Level Meter. At noise measurement locations, GPS coordinates were taken and map with selected locations developed as shown in the baseline chapter of this report.

Duration of the measurements

Short-term noise monitoring was undertaken at selected points for a period of 10-15 minutes at each point. A weighted sound level exceeded for N% of a given measurement period is denoted LN of that level. E.g. L10 is the noise level exceeded for 10% of the time measured. L90 is a commonly used measure of the average minimum or background A-weighted noise level and has formed the main basis of discussion.

Quality assurance and quality control

Calibration

The noise meter was calibrated before use with an *Extech sound meter* calibrator to ensure consistency of results.

Minimizing interference

- “Free-field” noise measurements i.e., levels where influence of reflections is minimized were made and measurement carried out at least 1.5 metres from any reflecting structure other than the ground.
- In all cases, measurements were taken at receptors as the most useful measurement position. This aimed to avoid the influence of domestic noise (i.e., noise from occupants of the dwelling and their activities).

Analytical methods

The Extech sound level meter records noise levels and calculates peak maximum, minimum, and average noise levels. The meter also provides the L₃₀, L₅₀ and L₈₀ levels at which noise values are taken.

Benchmarking

A benchmarking study was undertaken in Kalangala District where oil palm is currently grown and factories for processing exist and results recorded in Table 3-5. During the benchmarking study, the following approach was used for data collection

- Observation of oil palm production activities that generate noise
- Sampling of level of noise at different selected points within the mill and its environs.

Table 3—5:Noise measurements taken in Kalangala Oil Palm Project for bench marking

Location	Noise measurement d(B) A				Permissible Limits (dB(A))	Source of noise
	Level	Min.	Max.	Av.		
Generator area	80	57.3	60.6	59.0	85	Noise from Kernel and Boiler section
	50	56	57.1	56.6		
	30	53.3	54.5	53.9		
CPO Mill	80	76.4	79.6	78	85	Grading, vibrating, sterilisation, threshing, and pressing processes
	50	73.6	75.8	74.7		
	30	71.2	74.3	72.8		
Administration Office/reception	80	52.3	55.8	54.1	50	Noise from vehicles delivering palm oil
	50	49.2	50.1	49.7		
	30	47.1	48.3	47.7		
Generator	80	49.5	50.1	49.8	85	Processes going on the mill.
	50	42.0	44.6	43.3		
	30	39.6	40.0	39.8		
Waste Treatment Ponds	80	69.8	70.1	70.0	85	Water pump
	50	64.6	66.0	65.3		
	30	49.3	56.4	52.9		
Community at the landing site	80	57.3	60.6	59.0	70	Music from radio, motorcycles
	50	56	57.1	56.6	70	
	30	53.3	54.5	53.9	70	
Along one of the access roads within the project area	80	56.2	57.8	57.0	70	Automobiles along access road
	50	33.4	35.4	34.4	70	
	30	31.4	32.2	31.8	70	

3.5.9 Socio-economic survey

The social assessment used qualitative methods and several techniques in data collection, including, key informant interviews (stakeholder consultations), focus group discussions and case study reviews. These were vital in establishing the social baseline information and subsequent assessment of potential social impacts. The choice of the sample point will be predetermined and done based on areas identified as potential for oil palm establishment, and therefore potential exposure to environmental and social impact of the project.

3.5.10 Archaeological and Cultural Heritage Assessment

A survey of the available literature was conducted with the aim of reviewing the previous research done in the project area. Various archaeological and historical sources were consulted and these included Kalungu District Conservation Management Plans, Department of Museums and Monuments database and online scholarly articles. It was found out that no significant research has been done in Kalungu District. However, archaeological and cultural heritage resources have been recorded to exist in a broader regional study of Buganda sub region.

3.5.10.1 Stakeholder engagement and consultations

Meetings and interviews with the relevant stakeholders were conducted. These included leaders at the district, sub county and village levels and the local communities at large. This was majorly intended to obtain oral histories regarding the cultural heritage of the project area. The locals are believed to be the custodians and also have a clear understanding of their heritage resources. The locals of the visited villages in different Sub Counties were helpful in locating some of the heritage sites, identifying their significance and the impact of the project on the current socio-cultural lives.

3.5.10.2 Field visit and archaeological Survey

A physical cultural resources survey was conducted in selected villages in different parishes and Sub Counties in Kalungu District. This involved field walking within the project area to identify, locate and record any site/object of cultural heritage significance. The baseline condition and data obtained from literature survey was used to evaluate the potential impacts on cultural heritage associated with the Project. Because of limited time the study was limited to surface surveys and no intrusive archaeological surveys were conducted. However, archaeological artefacts are expected to be encountered during the project activities that involve ground disturbance, for example, digging up pits for oil palm seedlings and construction of access roads.

3.5.10.3 Documentation

The affected sites in the villages sampled were identified and recorded in terms of their individual location using a GPS co-ordinate; site current status/baseline, site significance and impact evaluation of individual sites were also examined.

3.5.10.4 Analysis of the findings

Cultural heritage resources were documented, analysed from the field and photos were taken at their depositional context. Potential impacts of the proposed project on archaeological and cultural heritage resources were also evaluated.

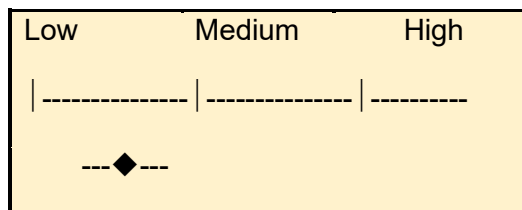
3.6 Analysis of impact significance

Direct, indirect, long term and short term positive and negative environmental and social impacts will be analyzed. The analysis included cumulative impacts with reference to IFC's good practice handbook to cumulative Impact Assessment and Management.

To establish impact significance, the impact assessment/analysis methodology summarized in Figure 3-1 below with a standardized three-step approach was used.

Step 1:

Baseline environmental and social conditions were firstly described in detail and valued on a continuous scale from 'low value' to 'high value' as illustrated below.



The value scale was assigned to the impact zones and the characteristics thereof. This value is related to international, national or local guidelines, standards and evaluations. Values were assigned to elements of the bio-physical environment such as flora, fauna, aquatic ecosystem, etc. The human environment aspects were taken to have "high value" due to their intrinsic value in addition to others.

Step 2:

The second step was to describe and evaluate the magnitude of potential project impacts, measured in terms of severity, time (duration) and space (site-specific, local, national, regional, international) as well as probability/risk of the impact to occur. The magnitude of impacts was evaluated on a scale from 'large negative' to 'large positive' as illustrated below.

Phase	Magnitude of Impacts
	Large neg. Medium neg. Minimal / no Medium pos. Large pos. ----- ----- ----- ----- -----
Planning	-----▲-----
Construction	-----▲-----
Operation	

Step 3:

The last step was to combine 'value' (step 1) and 'magnitude of impacts' (step 2) to obtain the 'overall impact assessment' (step 3) as illustrated in Figure 1 below. This assessment evaluates the significance of an impact on a scale ranging from 'very large negative' to 'very large positive'.

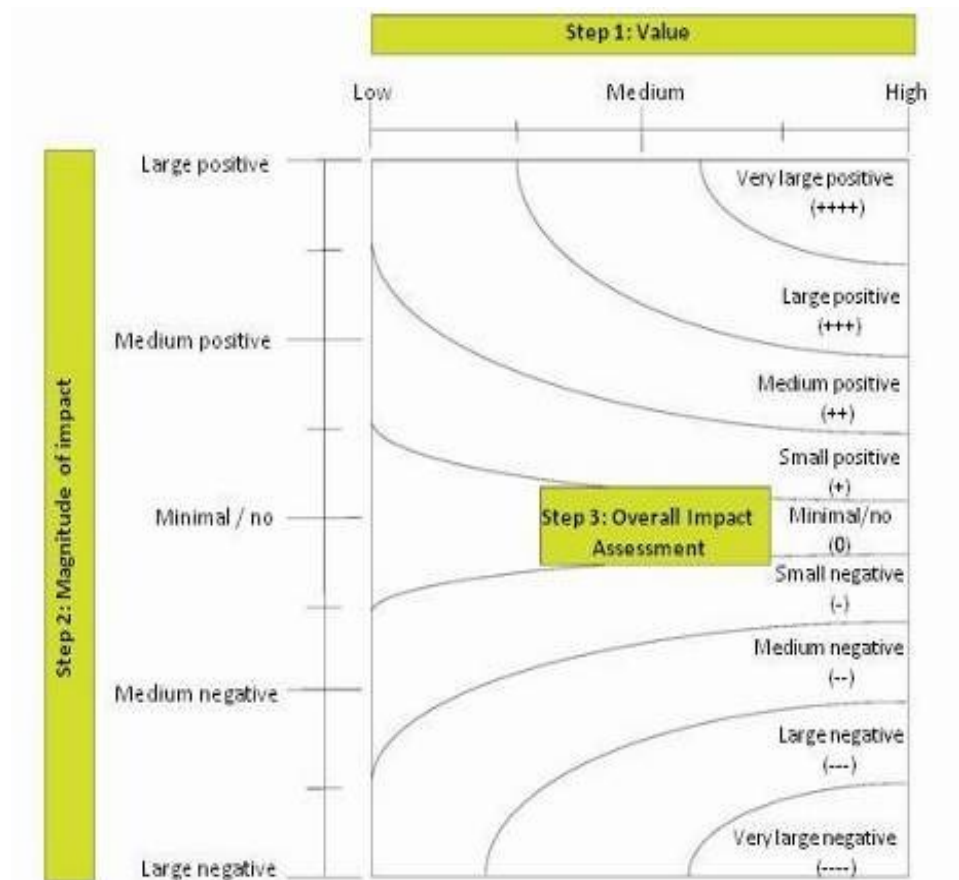


Figure 3-1 Summary of Impact Significance Assessment Methodology

3.7 Identification of mitigation/elimination/enhancement measures to the identified impacts

Once the significance of an impact had been characterized, the next step was to evaluate what mitigation and enhancement measures are warranted.

The priority in mitigation was to first apply mitigation measures to the source of the impact (i.e., to avoid or reduce the magnitude of the impact from the associated Project activity), and then to address the resultant effect to the resource/receptor via abatement or compensatory measures or offsets (i.e., to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude).

3.8 Environmental, Social Management and Monitoring Plan

An Environmental and Social Management and Monitoring Plan to ensure implementation of mitigation measures was developed. This plan is presented in a tabular form and includes potential significant impacts, proposed mitigation measures to address identified project impacts, parties responsible for implementing mitigation measures, monitoring indicators for checking the efficiency of mitigation measures, frequency of monitoring, time frame for implementation of mitigation measures/ monitoring and responsible parties.

4. POLICY, LEGAL, REGULATORY, AND INSTITUTIONAL FRAMEWORK

This chapter discusses national policies, laws and regulations relevant for successful implementation of the proposed project in an environmentally sustainable manner. The linkage of each of the cited policies, laws and regulations with the proposed project has been provided.

The requirements stipulated within this framework encompass all phases of the project including project design; land acquisition and resettlement; development of project infrastructure and operation phase.

4.1 National Policy Framework

4.1.1 The National Environment Management Policy, 1994

The overall goal of this policy is the promotion of sustainable economic and social development, mindful of the needs for future generations. ESIA is one of the vital tools considered necessary to ensure environmental quality and resource productivity on long-term basis. The Policy requires that projects or policies likely to have significant adverse ecological or social impacts undertake an ESIA before their implementation. This is also reaffirmed in the National Environment Act No.5, 2019 which makes ESIA a legal requirement for specific categories of projects as listed in the fifth Schedule.

Relevance to this Project

In line with this policy, this ESIA has been conducted and social and environmental impacts of the National Oil Palm Project project in Kalungu District identified.

4.1.2 National Agricultural Policy, 2013

The sector is guided by the National Agriculture Policy (NAP). The overall development objective of NAP is to achieve food and nutrition security and improve household incomes through coordinated interventions that focus on enhancing sustainable agricultural productivity and value addition; providing employment opportunities, and promoting domestic and international trade. The NAP is pursued through six related strategic objectives, namely to: (i) ensure household and national food and nutrition security for all Ugandans; (ii) increase incomes of farming households from crops, livestock, fisheries and all other agricultural related activities; (iii) promote specialization in strategic, profitable and viable enterprises and value addition through agro-zoning; (iv) promote domestic, regional and international trade in agricultural products; (v) ensure sustainable use and management of agricultural resources; and (vi) develop human resources for agricultural development

Relevance to this Project

The NOPP aims at scaling up investment in smallholder oil palm development, through developing Oil Palm plantations, establishing and supporting Oil Palm growers. Implementation of the NOPP is in line with the National Agricultural Policy, 2013 objective of increasing incomes of farming households from crops, livestock, fisheries and all other agricultural related activities.

4.1.3 The National Fertilizer Policy 2016

The policy provides for use of both organic and inorganic fertilizers to increase soil fertility with the aim of increasing production of agricultural products to sustain the domestic and international market demands.

Relevance to this Project

The Project will finance the provision of fertilizers, it is in this regard that all application processes shall follow agreed management schedules and seasons to reduce wastage and environment pollution.

4.1.4 The National Seed Policy, 2018

The policy goal is to guide, promote, develop and regulate the seed sub-sector in order to ensure availability, accessibility and affordability of safe and high-quality seed to all stakeholders for increased food and nutrition security, household income, wealth creation and higher export earnings. The policy objectives are;

- i. To strengthen research and development for the seed sector.
- ii. To strengthen capacity of the key players along the seed value chain to achieve an effective and efficient seed sector.
- iii. To strengthen the seed quality control system along the entire value chain.
 - i. To enhance knowledge and information management for the seed sector.

Relevance to the Project

In line with principle seven; Private sector-led seed system, NOPP intends to foster access to quality and improved agricultural inputs for short season field/horticultural crops and small livestock production by:

- a. organization of specialized local seed producer groups for improved drought tolerant (OPV) varieties (by sub-county extension staff), including the development of community seed banks for bulking and conservation of more resilient varieties;
- b. support to village agricultural input shops by providing technical support to the interested beneficiaries in starting an input shop; and
- c. organization of fairs & business linkages events where producers and inputs suppliers can meet and negotiate, with facilitation from the PMU agriculture/extension officer.

4.1.5 Uganda National Land Policy, 2013

The overall goal of the Policy is 'to ensure an efficient, equitable and optimal utilization and management of Uganda's land resources for poverty reduction, wealth creation and overall socioeconomic development'. One of the guiding principles of the Land Policy is 'effective regulation of land use and land development. One of the objectives of this policy is to ensure

planned, environmentally- friendly, affordable and orderly development of human settlements for both rural and urban areas, including infrastructure development.

Relevance to this Project

The land required for this project implementation will be obtained and developed in line with the principles of this policy.

4.1.6 National Gender Policy, 2007

The goal of this policy is to mainstream gender issues in the national development process in order to improve the social, legal/civic, political, economic and cultural conditions of the people of Uganda, particularly women.

Relevance to this Project

This Project will require approximately 8100 households and 475 workers in nucleus estates during its implementation phases. This Policy advocates for equitable inclusion of women in the workforce and also requires provision of a work environment equally conducive to women as it is for men.

4.1.7 National Policy for the Conservation and Management of Wetland Resources, 1995

The overall aim is to promote the conservation of Uganda's wetlands in order to sustain their ecological and socio-economic functions for the present and future wellbeing of the people. One of the goals of the policy is to 'Maintain the functions and values derived from wetland resources throughout Uganda'. Another goal is to 'Maintain a biological diversity in wetlands either in the natural community of plants and animals or in the multiplicity of agricultural activity.' One of the specific Policy strategies is that 'There will be no drainage of wetlands unless more important environmental management requirements supersede'.

Relevance to this Project:

This Project designs will adhere to the principles of sustainability such that areas within wetlands are left intact are not touched.

4.1.8 National Water Policy, 1999

The National Water Policy promotes a new integrated approach to manage the water resources in ways that are sustainable and most beneficial to the people of Uganda. The goal of this policy is to provide guidance on development and management of the water resources of Uganda in an integrated and sustainable manner, so as to secure and provide water of adequate quantity and quality for all social and economic needs, with full participation of all stakeholders and mindful of the needs of future generations. The policy aims to:

- Promote rational use of water;
- Control pollution and promote safe storage, treatment and disposal of waste, which could pollute water and impact public health; and
- Promotion of awareness of water management and development issues and capacity building.

Relevance to this Project

In line with policy, project planning should ensure that community water sources within and in the vicinity of the project area are protected.

4.1.9 Occupational Health and Safety Policy

This policy seeks to:

- Provide and maintain a healthy working environment;
- Institutionalize OHS in the power-sector policies, programs and plans; and
- Contribute towards safeguarding the physical environment.

The OHS Policy Statement is guided by the Constitution of the Republic of Uganda and other global, national and sectoral regulations and policies. The OHS Policy also takes into recognition of the Health Sector Strategic Plan, all of which aim to improve the quality of life for all Ugandans in their living and working environment.

Relevance to this Project

This policy is especially relevant for occupational health and safety of construction workers and subsequently, operation, maintenance personnel and community safety at large. Mitigation measures for protecting the public from health and safety impacts as a result of project construction and subsequent operation and maintenance activities have been provided in the ESIS and should be implemented during the project development.

4.1.10 HIV/ AIDS Policy, 2011

Current effort to combat HIV/AIDS is characterized by a policy of openness by Government and this has, to a large extent, been emulated by civil society, political and social institutions, and workplaces. HIV/AIDS is recognized by Ministry of Health as a considerable risk in construction of infrastructure projects and it (together with the Ministry of Gender, Labour and Social Development) encourages employers to develop in-house HIV/AIDS policies, provide awareness and prevention measures to workers and avoid discriminating against workers living with or affected by HIV/AIDS.

To ensure HIV/AIDS is addressed in the workplace, the policy encourages employee awareness and education on HIV/AIDS. To protect the infected and affected persons from discrimination, employers are required to keep personal medical records confidential. Employees living with, or affected by, HIV and AIDS, and those who have any related concerns, are encouraged to contact any confidant within the organization to discuss their concerns and obtain information. It is anticipated that during the construction phase, there may be an influx of people into the project area possibly resulting into sexual fraternization and a risk of HIV/AIDS spread. The policy also guides about HIV/AIDS management including awareness and provision of condoms in workplaces.

Relevance to this Project

Labour will be required during the project implementation. The project will introduce new people into the communities, who will be hired on the project or those looking for employment opportunities. This will increase the risk of spreading HIV/AIDS, including young girls. The contractors shall develop HIV/AIDS management plans to guide sensitization meetings and other activities aimed at addressing the issue of spread of HIV/AIDS, in line with this Policy.

4.1.11 National Environment Health Policy, 2005

Environmental health encompasses a wide range of subjects; however, this policy is concerned primarily with; water supply, sanitation and hygiene promotion, solid, liquid and hazardous and health care waste management, air pollution control, food safety and hygiene, the control of insect vectors and vermin, occupational health and safety, road safety and housing conditions. The policy is primarily implemented by the Ministry of Health.

Relevance to this Project

In accordance with this policy provisions, a health and safety management plan, and a comprehensive waste management plan Shall be prepared and implemented during the construction and operation phases of the project.

4.1.12 The Uganda Wildlife Policy, 2014

The policy is an update of the Uganda Wildlife Policy (1999) which forms the basis of the Uganda Wildlife Act, Cap 200. One of the strategies to achieve the objectives of this policy include ensuring that all new developments and interventions within critical habitat areas are subjected to appropriate environmental impact assessments.

Relevance to this Project

The project area in Kalungu District has some wetlands, rivers and is within the vicinity of Lake Victoria, NOPP implementation will be in such a manner to avoid these areas. Smallholder farmers how own land close to wetlands and critical habitant areas will be left out.

4.1.13 The National Energy Policy, 2002

Outlines the objectives of the energy sector in Uganda, which includes among others, the requirement to manage energy related environmental impacts.

Relevance to this Project

During the processing of palm oil in the CPO mill, caution will be taken to ensure that surrounding environment is not polluted due to oil spillage or improper hazardous waste management.

4.1.14 Uganda National Culture Policy, 2006

The Uganda National Culture Policy aims to promote aspects of Uganda's cultural heritage that are cherished by its people. The policy recognizes that Uganda has several cultural sites and monuments. Some of them are man-made while others are natural. These sites, monuments and antiquities are important for socio-cultural and educational purposes. Cultural beliefs, traditions and values are core to a community's mechanism for survival. The policy sets guidelines to enhance the appreciation of these cultural values and to mitigate social practices that are oppressive to people.

Relevance to this Project

Project implementation will seek inputs of cultural leaders within the project area to reduce or avoid activities that are considered harmful to the cultural sites in the area. Any graves or shrines that may be encountered within the project footprint will be relocated in accordance with the cultural beliefs, traditions and values of the affected community. A chance finds procedure has been developed to guide the process.

4.2 National Legislative Framework

4.2.1 The Constitution of the Republic of Uganda, 1995

The 1995 Uganda Constitution provides that every person has a right to own property (Section 26(1)) and that no person shall be compulsorily deprived of property or any interest in or right over property without prompt payment of fair and adequate compensation, prior to the taking of possession or acquisition of the property.

Article 237 (a) on landownership indicates that government or a local government may, subject to Article 26, acquire land in the public interest. Article 237(b) entrusts the central government or local government with the responsibility to hold in trust for the people and protect, natural lakes, rivers, wetlands, forest reserves and any resources to be reserved for ecological and tourism purposes for the common good of the Ugandan people. Article 39 of the Constitution provides that every Ugandan has a right to a clean and healthy environment.

Relevance to this Project

The implementation of this project will be conducted in a manner that will incorporate the appropriate safeguards for environmental and social issues, especially land takes. Any land required for the implementation of this project will be obtained within the confines of the law.

4.2.2 National Environment Act, No.5 of 2019

The National Environment Act No.5, 2019 contains provisions for environmental management and protection including the need to carry out Environmental Impact Assessment (EIA) studies in connection with some categories of projects that are likely to have significant impacts on the environment as contained in its Schedule 5.

It is also a requirement under this Act that sites disturbed by any development be restored to their original state and the authority may issue an environmental restoration order in matters relating to management of environment and natural resources.

Relevance to this Project:

Agricultural establishments such the National Oil Palm project are listed under category 6, any development that involves agricultural investment, livestock, range management and fisheries, subsection (a) Large scale cultivation of 20 hectares and more in the fifth Schedule and are therefore required to be preceded by EIA.

4.2.3 The Land Act, Cap 227

The Land Act provides for tenure, ownership and management of land. Section 44 reiterates the Constitutional mandate for government or a local government to protect environmentally sensitive areas for the common good of the people in Uganda. Section 45 states that the use of land shall conform to the Town and Country Planning Act, that is in line with the Physical Planning Act, 2019.

Relevance to this Project

The extent of works designed to ensure implementation of the National Oil Palm Project will necessitate land take in some sections of the project area. Any land required for the implementation of this project will be acquired in accordance with the provisions of this Act.

4.2.4 The Physical Planning Act, 2019

Uganda has since gone through many social, political and economic changes. For example, promulgation of the 1995 Constitution established as a decentralized system of governance which divulged powers and functions including physical planning, finance and execution of projects from the central government to local governments. This therefore created a need to enact a physical planning legislation which is consistent with this Constitutional requirement. The Physical Planning Act, 2019 establishes district and urban physical planning committees, provides for making and approval of physical development plans and applications for development.

Section 37 of The Physical Planning Act, 2019 requires an EIA permit for developments before they are implemented, stating:

“Where a development application related to matters that require an environmental impact assessment, the approving authority may grant preliminary approval subject to the applicant obtaining an EIA certificate in accordance with the National Environment Act No. 5 of 2019”.

Relevance to this Project

This ESIA for the National Oil Palm Project in Kalungu District has been undertaken and will be presented to the physical planning committee for review and further decision making.

4.2.5 The Uganda Wildlife Act, 2019

The Wildlife Act established the Uganda Wildlife Authority and has several sections on the management of wildlife conservation areas among other issues pertaining to wildlife in Uganda. Relevant contents of this Act include; restrictions on ownership of every wild animal and wild plant existing in its wild habitat to Government, requirement for environmental impact assessment for any project which may have a significant effect on any wildlife species or community. Uganda Wildlife Authority is mandated under this act to ensure the sustainable management of Wildlife Conservation Areas.

The purpose of the Act among others, is to provide for; the conservation of wildlife throughout Uganda so that the abundance and diversity of their species are maintained at optimum levels commensurate with other forms of land use, in order to support sustainable utilization of wildlife for the benefit of the people of Uganda, the sustainable management of wildlife conservation areas, the conservation of selected examples of wildlife communities in Uganda, the protection of rare, endangered and endemic species of wild plants and animals, the implementation of relevant international treaties, conventions, agreements or other arrangement to which Uganda is a party; and public participation in wildlife management.

Relevance to this Project

Section 23 of this Act makes ESIA a requirement for any developer desiring to undertake any project which may have a significant effect on on any wildlife species or community in accordance with the National Environment Act, 2019.

4.2.6 The Public Health Act, Cap 281

This Act aims at avoiding pollution of environmental resources that support health and livelihoods of communities. The Act gives local administrative units authority (Section 103) to prevent

pollution of watercourses in interest of public good. Section 54 provides a general prohibition of nuisances or conditions liable to be hazardous to health on any land.

Relevance to this Project

Project proponent must undertake all necessary and reasonable practical measures for preventing the occurrence of, or dealing with any outbreak or prevalence of, any infectious communicable or preventable disease in addition to minimizing vibration and noise nuisances within the proposed project area.

4.2.7 The Water Act, Cap 152

The objective of the Act is to enable equitable and sustainable management, use, and protection of water resources of Uganda through supervision and coordination of public and private activities that may impact water quantity and quality. Section 18 requires that before constructing or operation of any water works, a person should obtain a permit from the Directorate of Water Resources Management (DWRM). The Act also aims to control pollution of water resources. Section 19 provides that subject to guidelines established by the Minister from time to time, the Director (of water resources management) may exempt a public authority or a class of persons or works from requirements in Section 18 on such conditions as he or she may deem fit. Since this decision is reached upon evaluation of an application submitted to the Directorate, Section 19 does not automatically preclude works by public agencies from applying for permits prescribed by this Act. Section 20 has provisions for the standard conditions under which a holder of a permit should use a water resource.

Relevance to this Project

Waste management during the implementation of the proposed National Oil Palm Project should demonstrate that (i) no waste comes into contact with water; (ii) no waste is discharged directly or indirectly into a water body and (iii) no water is polluted in any other way or by any other substance due to activities related to the proposed project.

4.2.8 Workers' Compensation Act, 2000

Section 28 of The Workers' Compensation Act (2000) states that:

- Where a medical practitioner grants a certificate that a worker is suffering from a scheduled disease-causing disablement or that the death of a workman was caused by any scheduled disease; and,
- The disease was due to the nature of the worker 's employment and was contracted within 24 months immediately previous to the date of such disablement or death, the worker or, if he or she is deceased, his or her dependants shall be entitled to claim and to receive compensation under this Act as if such disablement or death had been caused by an accident arising out of and in the course of his or her employment.

Relevance to this Project

The National Oil Palm Project will require workers during implementation phases. Any injury or illness resulting from project related activities will be subject to conditions of the Workers' Compensation Act.

4.2.9 Employment Act, 2006

The Employment Act is the governing legal statutory instrument for the recruitment, contracting, deployment, remuneration, management and compensation of workers. The Act is based on the provisions of Article 40 of The Constitution of Uganda. The Act mandates labour Officers to regularly inspect working conditions of workers to ascertain those rights of workers and basic provisions are provided and workers' welfare attended to.

The Act also provides for the freedom of association of workers permitting workers to join labour organizations. Section 32 addresses the issue of child labour and states that children under the age of twelve years shall not be employed in any business, undertaking or workplace (32(1)). Subsection 32(2) provides restrictions under which a child under the age of fourteen (14) years may be employed; including for light work under the supervision of an adult aged over eighteen (18) years and the work shall not interfere with the child's education.

Relevance to this Project

This project will require workers during implementation phases. The working conditions and workers' welfare, including child labour will be governed by the provisions of this Act. MAAIF will also be involved in ensuring compliance with the provisions of the Act for this Project.

4.2.10 Occupation Safety and Health Act, 2006

The Act requires employers to provide and maintain safe working conditions, and to take measures to protect workers and the public from risks and dangers of their works, at his or her own cost (Section 13). Employers with more than 20 workers should prepare and often revise a written policy with respect to safety and health of workers (Section 14). The contractor therefore is obliged to provide employers with washing facilities, First Aid, facilities for meals and safe access to workplaces.

Relevance to this Project

This Project will require workers during implementation phases. This Act requires MAAIF and all contractors to ensure that workers have a safe working environment at all times and that their health is not at risk as a result of the working environment.

4.2.11 The Children's Act, Cap 59

This is an Act to reform and consolidate the law relating to children; to provide for the care, protection and maintenance of children; to provide for local authority support for children; to establish a family and children court; to make provision for children charged with offences and for other connected purposes.

Part II of the second schedule of this Act defines a child as a person below the age of eighteen years.

In the same schedule under Section 8 of this Act provides that no child shall be employed or engaged in any activity that may be harmful to his or her health, education or mental, physical or moral development.

Relevance to this Project

This Project will require workers during construction, operation and maintenance phases. No child should be employed under project work force requirement however, any employment or engagement of children will be done in line with the restrictions of this Act and the Employment

Act to ensure that risks to children are either eliminated, or reduced to as low as reasonably practicable. The contractors will have an orientation on all the labour laws including the child labour before starting works. The contractors will consult and involve the LC1 chairmen and Community Development officers during recruitment process of workers.

4.2.12 The Penal Code Act, Cap 120 (as Amended, 2007)

This is an Act to establish a code of criminal law. Section 129 criminalizes defilement of girls under the age of eighteen. Section 131 criminalizes procuration of women or girls to become common prostitutes. Sections 136 – 137 criminalizes people who make earnings from prostitution, and Section 139 provides a penalty of imprisonment for seven years for anyone who practices or engages in prostitution.

Relevance to this Project

The project contractors, both local and international, will have to operate in accordance with the provisions of this law and desist from engaging in commercial sexual exploitation of workers and local community members, especially the children. The Contractors will also have to put in place strict social safeguards to discourage fraternization with the local community that could result in defilement and rape. MAAIF will be responsible for the conduct of contractors for the duration of the project implementation. It will be the responsibility of MAAIF to ensure that the contractors procured do not have any dealings in illegal activities including prostitution. The contractor will be required a grievance management committee to address such issues identified. Guidance notes will need to be prepared to analyze the different cases and proposed mitigation action.

4.2.13 The Historical and Monuments Act, Cap 46

This Act provides for the preservation and protection of historical monuments and objects of archaeological pale-ontological ethnographical and traditional interests. Under this Act, the Minister has wide ranging powers to protect any of the above objects and under Section 8, no person whether owner or not shall cultivate or plough the soil so as to effect to its detriment any object declared to be protected or preserved, and no alteration is permitted on any object declared to be protected or preserved. And under Section 11, any person who discovers any object which may reasonably be considered to be a historical monument or an object of archaeological, pale-ontological, ethnographical, and traditional interests is required to report it to the Conservator of Antiquities within 14 days of the discovery.

Relevance to this Project

Any objects, material or infrastructure found that may be identified as falling under the category of 'archaeological pale-ontological ethnographical and traditional interests' during the project implementation will therefore, be reported to the Department of Museums and Monuments for advice and where necessary undergo a forensic assessment. A procedure for handling any 'chance finds' during Project implementation will be prepared for the protection of Physical Cultural Resources (PCRs) as part of the Environmental and Social Management and Monitoring Plan.

4.2.14 The Plant Protection and Health Act 2015

The Plant Protection and Health Act intends to consolidate and reform the law relating to plant protection regarding destructive diseases, pests and weeds. This Act is focused on prevention of introduction and spread of harmful organisms that may adversely affect Uganda's agriculture, the national environment and livelihood of the people. The Act aims to regulate the export of plants and plant products and introduction of new plants in accordance with international commitments. The Commissioner for Agriculture is responsible for the implementation of this Act.

Relevance to this Project

The Project will need to consider measures to minimize the introduction and spread of invasive species.

4.2.15 The Traffic and Road Safety Act, 1998

This is the main Act governing road transport in the country. In particular, the Act provides for among other things the use of a motor vehicle trailer or engineering plant on any road, need for the registration of all motor vehicles, the need for obtaining driving permits, the requirement to comply with road signs and speed limits, the procedure to be followed at the time of an accident, and the need for the employer to keep record of drivers.

Relevance to the Project

MAAIF and contactors should ensure that all motor vehicle usage is in line with this Act during implementation of the proposed project.

4.2.16 Petroleum Supply Act 2003

The Act provides for the supervision and monitoring of transportation, supply, storage and distribution of petroleum products for road construction works. The Act regulates licensing and control of activities and petroleum installations for protection of public health and safety and control of environmental pollution.

Section 3, Part (d) ensures public safety and protection of public health and the environment in all petroleum supply operations and installations.

According to this Act, "petroleum products" includes asphalts and bitumen, oils as well as conventional petroleum fuel. This Act will apply to management (construction, operation and decommissioning) of fuel handling facilities during road construction including fuel transportation, constructing and operation of storage tanks and consumption of petroleum products. Section 17(1) prohibits constructing a petroleum products installation without having obtained a petroleum construction permit. Section 18 provides guidance on process leading to securing this permit.

Relevance to the Project

Project implementation is anticipated to consume considerable amounts of petroleum products therefore all foregoing provisions will be important for construction and operation of onsite fuel storage facilities during implementation of the National Oil Palm Project.

4.3 National Regulatory Framework

4.3.1 The National Environment (Environmental and Social Assessment) Regulations, S.I No.143 of 2020

The regulations provide a framework within which ESIA for projects are undertaken. It also emphasizes that an environmental and social impact study for relevant projects be undertaken in accordance with section 113 of the National Environment Act and Schedule 5 of the same Act. The regulations emphasize the adoption of the mitigation hierarchy during project planning. The regulations also introduce penalties for noncompliance to the Act.

Relevance to the Project

This ESIA has been prepared in compliance with these regulations.

4.3.2 National Environment (Waste Management) Regulations S.I. No. 49 of 2020

These regulations categorise the different types of waste including hazardous waste. The regulations provide that only licensed handlers can collect, store, transport and dispose of hazardous waste. An adequate waste management plan for the project shall be developed and implemented in conformance with these regulations. More so, a licensed handler shall be procured to handle any hazardous waste generated by the project activities. The practices emphasized under these regulations are aimed at preventing the contamination of water, air, soil and other components of the environment.

Relevance to the Project

The regulations promote cleaner production methods that enable the recovery and reuse of wastes, reclamation and recycling. Further the regulations would influence management of solid waste throughout the project implementation phases.

4.3.3 National Environment (Wetlands, Riverbanks and Lakeshores Management) Regulations S.I No. 2/2000

These regulations provide principles for sustainable use and conservation of wetlands, and riverbanks. The regulations provide for; Mandatory ESIA for all major activities on riverbanks and lakeshores, and Development and implementation of measures to prevent soil erosion, siltation and water pollution. This ESIA has been undertaken in compliance with these regulations and the required mitigations for prevention of soil erosion, silting shall be developed and implemented.

Relevance to the Project

The project area consists of permanent swamps of Katonga wetland largely dominated by *Cyperus papyrus* and *Phragmites australis* in Lwabenge sub county and Lukaya Town council, seasonal swamps were apparent on private landscape and valleys; herbaceous vegetation, and seasonally flooded grasslands especially in the flood plain areas of Bukulula subcounty facing River Katonga Wetland areas. The project proponent will be required to adhere to provisions of these regulation during implementation.

4.3.4 The National Environment (Standards for Discharge of Effluent into Water or Land) Regulations, 2020

These regulations require that a permit is acquired before a developer discharges wastewater into water bodies or on land. Maximum permissible levels for discharge of waste have been provided under Schedules 2, 3 and 4 of these regulations as shown in Table 4-1 and Table 4-2

Table 4—1: Standards for general chemicals and micro-biological discharge

No.	Parameter or Pollutant	Unit	Maximum Permissible Limit
1	Temperature increase	°C	≤5
2	Odour		Not detectable
3	Colour	TCU	50
4	pH	Units	5.0-8.5
5	Electrical Conductivity	µS/cm	1000
6	Total Dissolved Solids	mg/L	750
7	Total Suspended Solids	mg/L	50
8	Biological Oxygen Demand (Unfiltered)	mg/L	50
9	Chemical Oxygen Demand	mg/L	70
10	Cyanide (Free)	mg/L	0.1
11	Cyanide (AD)	mg/L	0.5
12	Cyanide (Total)	mg/L	0.1
13	Nitrogen (Total)	mg/L	10
14	Nitrogen (Ammonia)	mg/L	10
15	Nitrogen (Nitrates)	mg/L	10
16	Total Kjeldahl Nitrogen	mg/L	10
17	Phosphorus (Total)	mg/L	5
18	Sulphates	mg/L	500
19	Chlorides	mg/L	250
20	Chlorine (Residual)	mg/L	0.2
21	Total Coliforms	CFU/100ml	400
22	Fluorides	mg/L	2
23	Sulphides	mg/L	1
24	Urea	mg/L	1

Table 4—2: Table Standards for inorganic substances effluent discharge Effluent requirements are for direct discharge into surface water, land or sewer

No.	Parameter or Pollutant	Unit	Maximum Permissible Limit
1	Aluminium	mg/L	0.5
2	Antimony	mg/L	0.5
3	Arsenic	mg/L	0.1
4	Barium	mg/L	10
5	Beryllium	mg/L	0.1
6	Cadmium	mg/L	0.01
7	Calcium	mg/L	100
8	Chromium (Hexavalent)	mg/L	0.05
9	Chromium (Total)	mg/L	0.5
10	Cobalt	mg/L	0.1
11	Copper	mg/L	0.5
12	Iron (Total)	mg/L	3.5
13	Lead	mg/L	0.1
14	Magnesium	mg/L	100
15	Manganese	mg/L	1
16	Mercury	mg/L	0.01
17	Nickel	mg/L	0.5
18	Selenium	mg/L	0.02
19	Silver	mg/L	0.5
20	Tin	mg/L	2
21	Total Metal	mg/L	10
22	Vanadium	CFU/100ml	1
23	Zinc	mg/L	2

Relevance to the Project

The regulations require that facilities to install pollution control equipment for onsite management of effluent before it can be discharged into water or land. In compliance with these regulations, the project will develop a Waste Management Plan and will provide for installation of appropriate equipment and measures for effluent management including monitoring of effluent.

4.3.5 National Environment (Noise Standards and Control) Regulations, 2003

Part III Section 8 (1) requires machinery operators, to use the best practicable means to ensure that the emission of noise does not exceed the permissible noise levels. The regulations require that persons to be exposed to occupational noise exceeding 85 dBA for 8 hours should be provided with requisite ear protection. The regulatory noise limits at are presented Table 4-3.

Table 4—3: Table Permissible Noise Levels

Facility	Noise Limit dB (A) (Leq)	
	Day	Night
Residential buildings	50	35
Mixed residential (with some commercial and entertainment)	55	45
Residential + industry or small-scale production + commerce	60	50
Industrial	70	60
Time frame: Day – 6.00 a.m -10.00 pm; Night: 10.00 p.m. – 6.00 a.m. The time frame takes into consideration human activity.		

Source: *The National Environment (Noise Standards and Control) Regulations, 2003.*

Relevance to the Project

Regulations require project implementors to allocate appropriate Personal Protective Equipment (PPE) to all workers and especially those in areas where noise generation could exceed the permissible levels. In addition, regular maintenance of equipment including machinery shall be undertaken throughout the project. Furthermore, as a requirement, generators be installed with silencers to minimise emission of noise.

4.3.6 Draft National Air Quality Standards, 2006

Considering that construction equipment and machinery are powered by diesel/ gasoline engines, pollutants such as CO₂, NO_x, SO_x, VOC and particulates are expected to be emitted. The draft national air quality standards provide the regulatory limits for these emissions as in Table 4-4. These standards shall be observed at worksites including equipment yards and workers' camps to ensure minimal impact on local air quality.

Table 4—4: Draft National Air Quality Standards, 2006

Pollutants	Averaging time for ambient air	Standard for ambient air
Carbon dioxide (CO ₂)	8 hr	9.0 ppm
Carbon monoxide (CO)	8 hr	9.0 ppm
Hydrocarbons	24 hr	5 mgm ⁻³
Nitrogen oxides (NO _x)	24 hr 1-year arithmetic mean	0.10 ppm
Smoke	Not to exceed 5 minutes in any one hour	Ringlemann scale No.2 or 40% observed at 6m or more
Soot	24 hr	500 µg/Nm-3

Sulphur dioxide (SO ₂)	24 hr	0.15 ppm
Sulphur trioxide (SO ₃)	24 hr	200 µg/Nm-3

Relevance to the Project

The project implementation activities throughout all the phases will cause a deuteriation in ambient air quality levels. Therefore, the project proponent is expected to comply with the requirements of the draft air quality regulations.

4.3.7 National Environment (Audit) Regulations, 2020

Schedule 3 to these Regulations provide projects for which an annual environmental compliance audit must be carried out by the respective developer. The regulations also provide for voluntary compliance audits for projects not listed in Schedule 3. All projects listed in Schedule 5 of National Environment Act are among those listed in Schedule 3 of the Regulations and require a mandatory annual environmental compliance audit.

Relevance to the Project

Following approval of this ESIA by NEMA, the proposed project will undergo mandatory annual environmental compliance audit.

4.3.8 The National Environment (Management of Ozone Depleting Substances and Products) Regulations 2020

The Regulations operationalize Uganda's commitment to the Montreal Protocol, through restrictions on the trade of controlled substances and licensing of persons intending to import or export-controlled substances.

Relevance to the Project

Resourcing of goods and materials should not be from a country that is not a signatory of the Montreal Protocol. Additionally, any imports of controlled substances should be licensed by the relevant authority, and free of listed materials.

4.3.9 National Environment (Control of Smoking in Public Places) Regulations, 2004

These regulations prohibit smoking in public places including working areas because of consequent health and fire hazards associated with smoking. Second hand smoke (SHS) is a complex mixture of more than 4,800 chemical compounds, including 69 known carcinogens. WHO indicates "scientific evidence has unequivocally established that exposure to tobacco smoke causes death, disease and disability"?

According to WHO, SHS is a human carcinogen for which there is no "safe" exposure level. To avoid public health risk from SHS, Uganda enacted a law: National Environment (Control of Smoking in Public Places) Regulations 2004 to avoid smoking in public places. Under this law, a public place is defined as, "any place to which members of the general public or segments of the general public ordinarily have access by express or implied invitation and includes any indoor part of a place specified in this schedule" and these places include, office buildings, work places, eating areas, toilets and public service vehicles. Under section 3(1) of these regulations, it is

stipulated that every person has the right to a clean and healthy environment and the right to be protected from exposure to second hand smoke.

Relevance to the Project

In regard to proposed project, these regulations will apply to areas communally used by workers such as site offices, canteens and work areas.

4.3.10 National Environment (Conduct and Certification of Environmental Practitioners) Regulations 2003

The Regulations establish the code of conduct for certification, registration of Environmental Practitioners and for the practice of environmental impact assessment in Uganda.

Relevance to the Project

MAAIF engaged a competent team of registered environmental practitioners to undertake the ESIA.

4.3.11 The National Environment (Minimum Standards for Management of Soil Quality) Regulations, 2001

These Regulations emphasize the need to: maintain and restore the minimum soil quality standards as well as enhance the inherent productivity of the soil in the long term; maintain minimum standards for the management of the soil for specified agricultural practices; follow the criteria and procedures for the measurement and determination of soil and apply the prescribed measures and guidelines for soil management.

Relevance to the Project

Project planning and execution should ensure that the quality of the soils within the proposed project area is not compromised, and if it is, that it is restored to as close to its original state as possible.

4.4 Institutional Framework

4.4.1 National Environment Management Authority (NEMA)

NEMA was established in January 1996 under the National Environment Act, Cap. 153 and is an independent Central Government Agency responsible for co-coordinating all environment-related matters to ensure the sustainable management of the environment. It has the following functions in relation to the proposed project: it co-ordinates the processes of EIA for listed activities; carries out, alongside other stakeholders, environmental monitoring and audits of road infrastructure activities; ensures and monitors compliance of listed activities with environmental guidelines; and harmonizes national and international performance standards in the road/infrastructure sector on environmental sustainability.

4.4.2 The Ministry of Agriculture, Animal Industry and Fisheries

The functions of the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) are derived from the Constitution of the Republic of Uganda, the Local Governments Act (1997) and the Public Service Reform Programme (PSRP). The role of MAAIF is to create an enabling environment in the Agricultural Sector by performing the following functions

- Formulate, review and implement national policies, plans, strategies, regulations and standards and enforce laws, regulations and standards along the value chain of crops, livestock and fisheries.

- Control and manage epidemics and disasters, and support the control of sporadic and endemic diseases, pests and vectors.
- Regulate the use of agricultural chemicals, veterinary drugs, biological, planting and stocking materials as well as other inputs;
- Support the development of infrastructure and use of water for agricultural production along livestock, crop and fisheries value chains.
- Establish sustainable systems to collect, process, maintain and disseminate agricultural statistics and information.
- Support provision of planting and stocking materials and other inputs to increase production and commercialization of agriculture for food security and household income
- Develop public infrastructure to support production, quality / safety assurance and value-addition along the livestock, crop and fisheries commodity chains.
- Monitor, inspect, evaluate and harmonize activities in the agricultural sector including local governments.

4.4.3 The Ministry of Water and Environment

The Ministry of Water and Environment is the line ministry responsible for the formulation and enforcement of environmental policies, laws and regulations in Uganda. Its main functions include: mobilization of resources required to run and implement environment related projects and related issues; overall responsibility for environmental policy formulation and implementation; introduction of new draft laws and regulations to parliament and draft amendments of existing laws and regulations; and coordination with local governments on environment related issues.

4.4.3.1 Directorate of Water Resources Management.

The Directorate Water Resources Management (DWRM), has a responsibility to regulate quality and quantity of water resources in the country. The Directorate is responsible for the full range of integrated water resources management (IWRM) activities including monitoring, assessing, planning, allocating and regulating water resources. Specifically, the Water Resources Planning Department is responsible for water regulation through issuance of permits for water abstraction and wastewater discharge.

4.4.3.2 Wetland Management Department (WMD)

WMD is mandated to manage and monitor the use of wetlands to ensure sustainability. The project will traverse a number of wetlands which requires monitoring and guidance from this Department.

4.4.4 Directorate of Labour, Employment and Occupational Health & Directorate of Gender and Social Development

The Ministry of Gender, Labour and Social Development (MoGLSD) through its Directorate of Labour, Employment and Occupational Health (which is responsible for administering the Occupational Safety and Health Act, 2006) carries out regular statutory inspections to ensure health and safety in the work place including construction sites and in the transport sector. Its functions include: ensuring that employment policies are in line with the country's labour policies

and guidelines; monitoring compensation for occupational injuries and diseases; monitoring compliance with labour standards; and ensuring that equipment and technologies brought into the country comply with the desired safety and health standards. In addition, through the Directorate of Gender and Social development carries out cultural growth, skills development and labour productivity for sustainable and gender responsive development. The Directorate is key in streamlining matters of gender, child protection.

4.4.5 Ministry of Lands, Housing and Urban Development (MLHUD)

Ministry of Lands, Housing & Urban Development is responsible for all matters concerning lands, housing and urban development. The Ministry will play a key role in the project with regards to land acquisition and, urban planning and development matters. The office of the Chief Government Valuer is located in the Lands Ministry.

4.4.6 Ministry of Tourism, Wildlife and Antiquities (MoTWA)

The mandate of the Ministry of Tourism, Wildlife and Heritage (MTWH) is derived from Article 189 and Sixth Schedule the Constitution of the Republic of Uganda (1995), Uganda Wildlife Act Cap 200, Uganda Tourism Act, 2008, Historical Monuments Act 1967, Universities and other Tertiary Institutions Act, 2006. The Ministry will have to be engaged by the proposed Project given the potential for the project to infringe on certain aspects of the afore-mentioned legal and regulatory aspects as part of the process.

4.4.6.1 Department of Museums and Monuments (MoTWA)

Archaeologists from the department responsible for museums and monuments would be useful in monitoring road project construction activities, especially excavations at borrow sites and any other excavation areas to ensure that chance finds or artefacts of cultural significance are not destroyed.

4.4.6.2 Uganda Wildlife Authority (UWA)

UWA's role is to conserve, economically develop and sustainably manage the wildlife and protected areas of Uganda in partnership with neighbouring communities and other stakeholders for the benefit of the people of Uganda and the global community. The Authority will be involved since the proposed project will be traversing natural habitats for wildlife.

4.4.7 Ministry of Local Government

The ministry is responsible for guidance and overall vision of Government in local Governments (LGs). The proposed project will be located in Kalungu district which has a local government that is monitored and coordinated by this Ministry.

4.4.8 Kalungu District Local Government

The District Local Government is defined as one of the lead agencies under the National Environment Act and is mandated to establish a District Environment Committee that coordinates with NEMA on all issues relating to environment management. Environment Officers in particular play an active role in monitoring of environmental aspects, and liaise with the NEMA on all matters relating to the environment. Environmental Officer from Kalungu District will be engaged by the project proponents since its within his/her area of jurisdiction. The LCV Council, with representatives from the sub-counties and technical staff in the district, will play a key role in

decision making at the district level where required for the Project. Additionally, the Physical Planner, Community Development Officer, District Health Officer, District Engineer, and District Land Board of the respective districts will also be involved during the development of the proposed project.

4.4.9 Non-Governmental Organizations and Civil Society Organizations

These organisations play a role in the road sector development through advocacy, mobilisation and dialogue with communities. They may also be contracted in the delivery of various services, especially in the communities where the activities are to be undertaken. Non-governmental organisations (NGOs) and Civil Society Organisations (CSOs) can contribute to holding the different players accountable with regard to development issues, and participate in getting the voices of the poor into designing, monitoring and implementation of programmes. Nguvu Energy will work with NGOs (e.g., those providing services such as child protection, HIV/AIDS, gender mainstreaming, road safety, water and sanitation, community livelihoods, environmental advocacy and conservation, professional boards, human rights among others) to streamline the project activities within the project area of influence.

4.5 International Conventions and/or Agreements

4.5.1 The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal

The Basel Convention is a global treaty aimed at protecting human health and the environment from risks posed by hazardous wastes and their transboundary movement. The treaty was adopted in 1989, came into force in 1992 and Uganda acceded to it on 11th March 1999. The overall goal of the Basel Convention is to protect, by strictly controlling, human health and the environment against the adverse effects which may result from the generation, transboundary movement and management of hazardous and other wastes. When hazardous wastes are dumped indiscriminately, spilled accidentally or managed improperly, they can cause severe health problems, or even death, and poison water and land for decades.

The Basel Convention started initiatives to manage e-waste in an environmentally sound management in 2002. In May 2019, the Convention was amended to include plastic waste in the legally binding framework.

Relevance to the Project

All chemical waste including electronic waste and plastics generated from the project implementation will have to be managed in an environmentally sound manner.

4.5.2 Stockholm Convention on Persistent Organic Pollutants, 2001

The Stockholm Convention is a global treaty designed to protect human health and the environment from Persistent Organic Pollutants (POPs). The Convention was adopted in May 2001 and entered into force in May 2004. Uganda acceded to the convention on the 20th July 2004. Its aim is to eliminate the intentional production and use of POPs and minimize releases from unintentional production of POPs, such as dioxins and furans, which are produced by incomplete combustion. Unintentional production and release of POPs on the project through activities such as open burning is undesirable.

Relevance to the Project

NOPP will use nationally and internally accepted organic chemicals, which don't harm the environment.

4.5.3 The Strategic Approach to International Chemicals Management (SAICM)

The Strategic Approach to International Chemicals Management (SAICM) was adopted in Dubai in February 2006. SAICM represent the first internationally agreed umbrella agreement for sound management of chemicals across all sectors. It provides a framework policy for achieving the Johannesburg Plan of implementation goal that chemicals will be produced and used in ways that minimize impacts to human health and the environment.

It is a non-legally binding policy framework that aims to facilitate the elimination and reduction of risks of chemicals throughout their life-cycle. It is desirable that chemicals on the project are managed in an environmentally sound manner.

Relevance to the Project

NOPP intends to construct management facilities of fertilisers and other agrochemicals in Kalungu district, to aid storage and easy transportation to farmlands. Proper measures shall be followed to avoid contamination during storage, transportation and application.

4.5.4 The Convention on Biological Diversity (CBD)

Uganda signed the Convention on Biological Diversity (CBD) in 1992 and ratified it in 1993. The CBD requires contracting parties to conserve their biological diversity and promote sustainable use of biological resources. Of specific relevance to future development projects in the area is Article 14 of the CBD which requires its Contracting Parties to introduce appropriate procedures for ESIA of proposals that might have effects on biological diversity, and to provide mechanisms for taking the biodiversity impacts of program and policies into account. Emphasis is given to in situ conservation in Protected Areas where rehabilitation of degraded ecosystems, recovery of threatened species, and protection of natural habitats and maintenance of viable populations of species in natural surroundings is carried out (CBD, Article 8). Therefore, as part of the decision-making process, the ESIA outcomes will need to be considered in the context of the responsibility of the Ugandan government to protect and conserve threatened species and natural habitats.

Relevance to the Project

The project area in Kalungu District has some wetlands, rivers and is within the vicinity of Lake Victoria, NOPP implementation will be in such a manner to avoid these areas. Smallholder farmers how own land close to wetlands and critical habitant areas will be left out.

4.5.5 The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

CITES recognizes that there exist many endangered species whose vulnerability is increased due to trade. The convention's main aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival.

Relevance to this Project

Floral and fauna assements will be done and species recorded identitied on the IUCN redlist and provide mitigation measures on how the project activities can implemented without endangering floral and funa.

4.5.6 African Convention on the Conservation of Nature and Natural Resources, 1982

The African Convention on the Conservation of Nature and Natural Resources (Organization of African Unity - OAU) notes that soil, water, flora and fauna constitute valuable capital, and that these are currently under threat. The convention notes that these resources have economic, nutritional, scientific, educational, cultural and aesthetic value. The main principle of the convention is that measures necessary to ensure conservation, utilization and development of these resources are undertaken in accordance with scientific principles and with due regard to the best interests of the people.

Relevance to this Project

The NOPP shall ensure less disturbance to natural resources. Kalungu district through its waste management strategy shall ensure proper management of both solid and liquid waste from entering downstream wetlands within the project area.

4.5.7 The United Nations Framework Convention on Climate change (UNFCCC), 1992

The United Nations Framework Convention on Climate Change (UNFCCC) is an international environmental treaty negotiated at the Earth Summit in Rio de Janeiro from 3 to 14 June 1992, then entered into force on 21 March 1994. UNFCCC has 197 parties as of December 2015 of which Uganda is a member. Its sister Rio Conventions are the UN Convention on Biological Diversity and the Convention to Combat Desertification. Preventing “dangerous” human interference with the climate system is the ultimate aim of the UNFCCC.

Relevance to this Project

The NOPP implementation is anticipated to contribute to climate through change of land use forms, eutrophication as a result from use of fertilizers, these impacts have been assessed and mitigation measures provided in line with this framework.

4.5.8 Convention for the Safeguarding of the Intangible Cultural Heritage, 2003

Unlike other UNESCO conventions, this convention begins with stating its purposes, which are to safeguard the intangible cultural heritage to ensure respect for the tangible cultural heritage of the communities, groups and individuals concerned to raise awareness at the local, national and international levels of the importance of the intangible cultural heritage, and of ensuring mutual appreciation thereof; to provide for international cooperation and assistance.

Relevance to this Project

Cultural Heritage found during the physical cultural surveys will be protected in line with the recommended measures in this ESIS.

4.5.9 The Ramsar Convention on Wetlands of International Importance, 1971

The Ramsar Convention's broad aims are to halt the worldwide loss of wetlands and to conserve, through wise use and management, those that remain. This requires international cooperation, policy making, capacity building and technology transfer. The Ramsar Convention encourages the designation of sites containing representative, rare or unique wetlands, or wetlands that are important for conserving biological diversity.

Contracting Parties make a commitment to:

- designate at least one site that meets the Ramsar criteria for inclusion in the List of Wetlands of International Importance

- promote the conservation and wise use of wetlands
- include wetland conservation within their national land-use planning
- establish nature reserves on wetlands and promote wetland training, and
- consult with other Contracting Parties about the implementation of the Ramsar Convention.

Relevance to this Project

The project area in Kalungu District has some wetlands, rivers and is within the vicinity of Lake Victoria, NOPP implementation will be in such a manner to avoid these areas. Smallholder farmers who own land close to wetlands and critical habitat areas will be left out.

4.6 International Standards and Guidelines

The NOPP will be developed in alignment with relevant international standards and guidelines. Key applicable standards and guidelines for the ESIA and project development include;

- IFC/World Bank Performance Standards and Guidelines
- IFAD Social, Environment and Climate Assessment Procedures
- Round Table for Sustainable Palm Oil (RSPO) Principles and Criteria

4.6.1 IFC Environmental Health and Safety Guidelines

General and industry-specific Environmental Health and Safety (EHS) guidelines have been developed by the IFC. The general guidelines provide examples of Good International Industry Practice (GIIP) with regards to mineral extraction and development. General EHS guidelines relevant to the Project area presented in Table 4-6.

Table 4—5: IFC General Environment Health and Safety Guidelines

General EHS Guidelines	Aspects applicable to the proposed project
Environmental	<ul style="list-style-type: none"> ▪ Air Emissions and Ambient Air Quality ▪ Energy Conservation ▪ Wastewater and Ambient Water Quality ▪ Water Conservation ▪ Hazardous Materials Management ▪ Waste Management ▪ Noise Emission and Ambient noise
Occupational Health and Safety	<ul style="list-style-type: none"> ▪ General project design and operation ▪ Communication and Training ▪ Physical Hazards ▪ Chemical Hazards ▪ Biological Hazards ▪ Personal Protective Equipment ▪ Special Hazard Environments ▪ Monitoring
Community Health and Safety	<ul style="list-style-type: none"> ▪ Water Quality and Availability

	<ul style="list-style-type: none"> ▪ Structural safety of Project Infrastructure ▪ Life and Fire Safety ▪ Traffic Safety ▪ Disease Prevention ▪ Emergency Preparedness and Response
Construction, operation and Decommissioning	<ul style="list-style-type: none"> ▪ Environment ▪ Occupational Health & Safety and ▪ Community Health & Safety

4.6.1.1 IFC Social and Stakeholder Engagement Guidelines

The ESIA has been prepared with consideration of the best practices put forward in the following IFC guidelines.

- 2002 Handbook for preparing for preparing a Resettlement Action Plan
- 2007 Stakeholder Engagement Handbook
- 2009 Good Practice Bote Addressing Grievances from project affected communities
- 2009 Handbook for addressing project induced migration and
- 2009 Health Impact Assessment

4.6.2 IFAD's Social, Environmental and Climate Assessment Procedures (SECAP)

4.6.2.1 IFAD Strategic Framework 2016- 2025 (Enabling Inclusive and Sustainable Rural Transformation)

IFAD's fifth Strategic Framework covers the period 2016-2025, serving as an overarching policy guideline to provide direction to IFAD's work, and as a key instrument for consolidating IFAD's development effectiveness. It positions IFAD to play a crucial role within the new global environment – by enabling an inclusive and sustainable transformation of the rural areas. The framework has three strategic objectives:

4.6.2.2 Private Sector Strategy

IFAD's Private Sector Strategy (2011) and the IFAD toolkit on Public-Private-Producer Partnerships in Agricultural Value Chains (2016) provide guidance on IFAD's engagement with the private sector, recognizing that IFAD's experience in this regard is still limited. VODP1 and VODP2 have actually been instrumental in defining IFAD's engagement with the private sector, and providing lessons learnt which are now applied throughout IFAD supported projects worldwide. NOPP will continue building on that partnership model and ensure that also larger agribusiness companies are interested in working with smallholder farmers.

4.6.2.3 Targeting Policy

IFAD's targeting policy: (a) defines IFAD's target group and establishes a shared conceptual understanding of targeting; (b) outlines the general principles that guide IFAD in identifying and

reaching the target group, and the methods and means that it uses to this end; and (c) provides an overview of how targeting should be addressed in IFAD's operations.

4.6.2.4 Gender Equality and Women's Empowerment Policy

IFAD's gender policy aims to promote economic empowerment to enable rural women and men to participate in and benefit from profitable economic activities; enable women and men to have equal voice and influence in rural institutions and organizations; and achieve a more equitable balance in workloads and in the sharing of economic and social benefits between women and men.

4.6.2.5 Climate Change Strategy

IFAD's Climate Change Strategy notes that IFAD's goal is to maximize the fund's impact on rural poverty in a changing climate.

4.6.2.6 Rural Finance Policy

IFAD's Rural Finance Policy has six guiding principles to be applied at the micro, meso and macro levels: (i) support access to a variety of financial services; (ii) promote a wide range of financial institutions, models and delivery channels; (iii) support demand driven and innovative approaches; (iv) encourage market-based approaches that strengthen rural financial markets, avoid distortions in the financial sector and leverage IFAD's resources; (v) develop and support long-term strategies focusing on sustainability and poverty outreach; and (vi) participate in policy dialogues that promote an enabling environment for rural finance

Round Table for Sustainable Palm Oil (RSPO) Principles and Criteria.

4.6.3 Round Table Sustainable Palm Oil (RSPO) Principles and Criteria

The RSPO is a not-for-profit organization that unites more than 2,500 stakeholder organizations in the palm oil industry, comprising oil palm producers, processors and traders, consumer goods manufacturers, retailers, banks and investors and environmental and social NGOs. Initiated by the World Wildlife Fund, the RSPO was formally established in 2004 with a mission to "transform markets to make sustainable palm oil the norm". The RSPO has developed a set of environmental and social criteria which companies must comply with in order to produce Certified Sustainable Palm Oil (CSPO). These criteria aim to minimize negative impact of oil palm cultivation on the environment and communities in palm-producing regions. The certification system was launched in 2007, with the first certificates issued in 2010. The current revised RSPO Principles and Criteria (P&C) were approved in 2013. Below are the principles and criteria for RSPO;

Principle 1: Compliance with applicable laws and regulations

- Criterion 1.1 The project will be implemented in compliance with all applicable local, national and ratified international laws and regulations
- Criterion 1.2 The right to use the land can be demonstrated
- Criterion 1.3 The right to the land does not diminish the legal or customary rights of other users

Principle 2: Management planning that aims to achieve long-term economic and financial viability for plantation and mills

- Criterion 2.1 Optimal productivity and quality of produce is achieved on planted land through appropriate agronomic and management practices
- Criterion 2.2 Plantation and mill practices are optimal to maintain production of high-quality crude palm oil.

Principle 3: Use of appropriate best practices in plantations and mills

- Criterion 3.1 Plantation and mill operating procedures are appropriately documented and consistently implemented and monitored
- Criterion 3.2 Practices must maintain, and if necessary, improve, soil fertility at a level that ensures high and sustained yield
- Criterion 3.3 Practices must minimize and control erosion and degradation of soils
- Criterion 3.4 Practices must maintain the quality and quantity of surface and ground water
- Criterion 3.5 Pests, diseases, weeds and invasive introduced species are effectively managed whilst pesticide use is minimized through using appropriate Integrated Pest Management (IPM) techniques
- Criterion 3.6 Pesticides banned by national legislation shall not be used and any other herbicides and pesticides should be used in a way that does not endanger health or environment
- Criterion 3.7 The on and off-site impacts of the plantation and mill management activities should be adequately assessed, controlled and monitored
- Criterion 3.8 An assessment of the social impacts, both positive and negative, of proposed operations in existing plantations is carried out and the results are incorporated into management planning and implemented in operational procedures
- Criterion 3.9 There is appropriate implementation of occupational health and safety requirements
- Criterion 3.10 All staff, workers and smallholders are adequately trained and competent

Principle 4: Environmental responsibility and conservation of natural resources and biodiversity

- Criterion 4.1 An understanding of the plant and animal species and habitats that exist inside and around the plantation shall be established
- Criterion 4.2 A plan to conserve and restore biodiversity in and around the plantation shall be developed, implemented and monitored
- Criterion 4.3 Waste from the plantation and the mill is reduced, recycled and re-used and any waste produced is disposed of in an environmentally and socially responsible manner
- Criterion 4.4 Efficiency of energy use should be maximized whilst minimizing fossil fuel use
- Criterion 4.5 Use of fire for waste disposal and for preparing land for replanting is avoided except in exceptional circumstances and should always be consistent with the ASEAN Policy on Zero Burning
- Criterion 4.6 Plans to reduce pollution and emissions, including greenhouse gases, should be developed, implemented and monitored

Principle 5: Responsible consideration of employees and of individuals and communities affected by plantations and mills

- Criterion 5.1 There is an effective, open and transparent method for communication and consultation between companies, local communities and other affected or interested parties
- Criterion 5.2 There is a documented system for dealing with complaints and grievances which is implemented and effective
- Criterion 5.3 Any negotiations concerning compensation for loss of legal or customary rights should be dealt with through a documented system that enables local communities and other stakeholders to express their views through their own representative institutions or other forms of collective bargaining
- Criterion 5.4 All workers have acceptable pay
- Criterion 5.5 All workers have acceptable conditions and the rights of workers to voluntarily organize and negotiate with their employers shall be guaranteed
- Criterion 5.6 Child labour is not used unless children are involved as part of small family owned and run enterprises and under adult supervision or an integrated education programme
- Criterion 5.7 Plantations and mills deal fairly and transparently with smallholders and other local businesses
- Criterion 5.8 Plantations and mills contribute to local development wherever possible

Principle 6: Commitment to continual improvement in all areas of activity

- Criterion 6.1 Plantation companies should regularly monitor and review their activities and develop and implement action plans that ensure continual improvement in all operations

Principle 7: Responsible development of new plantations

- Criterion 7.1 A comprehensive assessment of impacts or formal environmental impact assessment shall be undertaken prior to establishing new plantations or expanding existing ones and the results incorporated into plans and operations
- Criterion 7.2 Soil and topographic surveys and site planning should be conducted prior to the establishment of plantations and the results of these should be incorporated into plans and operations
- Criterion 7.3 Primary Forest and any area containing one or more High Conservation Values must not be converted to plantation
- Criterion 7.4 Extensive planting on steep, marginal and fragile soils is avoided
- Criterion 7.5 A comprehensive, participatory social impact assessment is carried out for all new plantings and the results are incorporated into all planning and operations
- Criterion 7.6 No plantations shall be established on indigenous peoples' land without their free, prior and informed consent as expressed through their own representative institutions
- Criterion 7.7 Customary rights and sacred sites are recognized and respected
- Criterion 7.8 Local people are fairly compensated for land acquisitions
- Criterion 7.9 Use of fire in the preparation of new plantations is avoided other than in specific situations that are consistent with the ASEAN Policy on Zero Burning.

Principle 8: Commitment to transparency

- Criterion 8.1 Plantation managers should provide full information to other stakeholders, except where this is prevented by commercial confidentiality or where disclosure of information would result in negative environmental or social outcome

4.7 Approvals, licenses and permits

Based on relevant national legislation, a number of approvals, permits and licenses will be required prior to commencement of the project or for specific activities within the scope of the project. Key requirements are summarised in Table 4-7 and ongoing consultation with relevant Government agencies will be required to identify any additional approvals, permits and licenses that may be required during construction and operation.

Table 4—6: Necessary permits, approvals and licenses required by the project.

	Permit Required	Issuing Authority	Legal Framework
1.	ESIA Certificate	NEMA	National Environment Act No.5 of 2019
2.	Water abstraction permit.	DWRM	Water Act, cap 152 and the Water Resources Regulations, 1998.
3.	Effluent Discharge permit	DWRM	Water Act, cap 152 and the Water Resources Regulations, 1998.
4.	Waste Disposal Permit	NEMA	National Environment Act No.5 of 2019; National Environment (Waste Management) Regulation, 2020.
5.	Storage of Hazardous/ Non-Hazardous Waste	NEMA	National Environment Act No.5 of 2019; National Environment (Waste Management) Regulation, 2020.
6.	License to emit noise in excess of permissible noise levels	NEMA	
7.	Permit for Storage of Petroleum Products	PSD/MEMD	Petroleum Act, Cap 2003
8.	Certificate of Registration of a Workplace	MGLSD	OHS Act, 2006
9.	Certification of Equipment	MGLSD, UNBS	OHS Act, UNBS Act
9	Licence of Use/Occupation and Construction for Temporary Buildings	Kalungu District Physical Planner	Physical Planning Act, 2020.

	Permit Required	Issuing Authority	Legal Framework
10	Waste Transportation and Disposal Permit	NEMA	National Environment Act, 2019; National Environment (Waste Management) Regulations, 2020
11	Permit to Carry Out a Regulated Activity in a Wetland/River Bank/Lake Shore a) 100m from the highest watermark of a river listed in Sixth Schedule; 30m for a non-listed river and b) 200m from the low watermark for a listed lake; 100m for a non-listed lake.	NEMA	The National Environment (Wetlands, River Banks and Lake Shores Management) Regulations, 2000

5. ANALYSIS OF PROJECT ALTERNATIVES

Regulation 15 of The National Environment (Environmental and Social Assessment) Regulations, 2020, requires that during the Environmental and Social Impact Study, an analysis of alternatives is carried out, including a detailed justification for the alternative selected to enable informed decision-making regarding the project. Also, regulation 21 of the same regulations requires the ESIS to take into account the proposed project alternatives, including a zero or no- project design or technologies to be used, and a justification for selecting the chosen option.

Several project alternatives were considered for this project, namely, the action option and no action option, design and technology options, and location alternatives. These were compared to determine which alternative represents the most desirable balance between environmental, social and economic costs and benefits.

5.1 The, “No Project Option”

NOPP will draw on the experience from the oil palm investment in Kalangala under VODP and VODP2 and build on the opportunities generated by a growing domestic palm oil industry to drive the transformation of the economies of those areas that are suitable for oil palm production and thus sustainably improve the incomes and livelihoods of rural communities. NOPP will facilitate the establishment of a vertically integrated value-chain with strong backward and forward linkages between the oil palm growers and primary processors. The arrangement will reduce the market risks faced by smallholders, such as the lack of a guaranteed market, the limited access to quality inputs and technical know-how and the limited availability of credit for medium- and long-term investment. Under this arrangement, the private sector partner will provide seedlings to OP smallholder growers and will purchase their FFBs at a transparently negotiated price; Government will develop the necessary public infrastructure and provide the growers with financial, technical and organizational support; and the smallholder growers will grow oil palm as a business, adopting the key practices required to guarantee the productivity of their oil palm plantation while ensuring conformity to environmental standards, and will deliver the FFBs to the CPO mills.

As evidenced under VODP/VODP2, the model is expected to create new economic opportunities for smallholder producers and others in the local communities; to result in increased incomes and improved livelihoods for them; and to catalyze broad-based rural economic growth. To ensure the target community’s livelihoods approach is fully covered, awareness creation on appropriate utilization of income at household level to ensure it supports the most important needs of different household members i.e. food, health, education, shelter clothing, etc will be crucial.

Finally, by supporting the development of an enabling policy and institutional framework to govern the oil palm sector, NOPP will enable GoU to establish the conditions for the sustainable and equitable development of the oil palm sector, and the further extension of the benefits already achieved under VODP and VODP2 and those to be achieved under NOPP to other rural communities that offer the scope for oil palm production.

The implementation of the NOPP will therefore have far reaching benefits to the project area and Uganda as a whole, which would not be realized if the project were not to be implemented. Ministry of Agriculture, Animal Industry and Fisheries' decision to implement this project in an environmentally sustainable manner will have greater benefits for local communities and Uganda as a whole, than not implementing the project and maintaining the existing biophysical, socio-economic and physical conditions at the site.

5.2 The Project Site

Only limited parts of the country have conditions proven to be suitable for growing oil palm, where rainfall, soil and temperature conditions are favorable. These include the mainland areas located in a narrow belt (25-30km) along Lake Victoria and surrounding the two island districts of Kalangala and Buvuma.

NOPP will concentrate its activities on smallholder OP development on the following hubs: Buvuma Island, Mayuge (including districts of Mayuge, Bugiri and Namayingo), Masaka including Districts of Masaka, Kyotera and Kalungu. Kalungu is one of the 3 districts selected to implement the Oil Palm Project within the Masaka Hub area.

The Kalungu component will basically focus on small holder farmers with an aim of accumulating a minimum of 3,000ha for OP. Different smallholder farmers have been approached and made aware of the project. These have been mapped to provide a basis for selection will depend on their location to conservation areas and consent for enrolling into the project.

5.3 Project Technology & Operations Option

The Project will work in a limited number of geographical hubs, where a hub is defined as an agro-climatically suitable area (not an administrative district), within a radius of 30 km around a planned or actual CPO mill, and in which a minimum of 3,000 ha of OP production can be assured. It is this radial area that marks the limits of financial viability for the producers, who may be smallholders only.

6. ENVIRONMENT AND SOCIO-ECONOMIC BASELINE

6.1 Socio-Economic and Cultural Environment

6.1.1 Political and Administrative Structure

Kalungu District has 2 constituencies (Kalungu East and Kalungu West) 5 sub counties, 33 Parishes and 319 villages. Kalungu District is composed of four (4) sub counties that include Bukulula, Kalungu, Kyamulibwa, and Lwabenge and three (3) Town Councils namely; Kalungu, Kyamulibwa and Lukaya.

6.1.2 Population and demographic characteristics

Kalungu District has a total population of 183,232 persons, of which 51.2 percent are females (93,553) and 48.9% females (89,679) giving a sex ratio of 94.3 men per 100 females. Of the total Population in Kalungu District, 45.8 percent are of primary school going age (6-12 years), 17.8 percent are of secondary school going age, 59.7 percent are children and 6.3 percent are elderly (60 years and above). The youth constitute of 18.5 percent, of which 54.1 percent are females. Considering the current retirement age of 65 years of age, the working population remains at 46.5 percent, which bears a heavy dependency burden from the higher percentage of the non-working population. The district had 41,606 households with an average household size of 4.4.

Table 6—1: Population of project affected sub counties

Sub-county	Household	Males	Females	Total
Bukulula	9,669	21,347	22,603	43,950
Lukaya Town Council	6,284	11,586	12,664	24,250
Lwabenge	7,517	17,001	17,269	34,270
Total	23,470	49,934	52,536	102,470

Source: UBOS Census 2014

6.1.3 Education and Literacy

The district has over 218 schools currently with 46 Nursery Schools, 134 Primary Schools, 33 Secondary Schools, 1 Tertiary institution, 2 Teachers College Schools. According to the Uganda Bureau of Statistics 2017 Report for Kalungu district, 86% of the children aged between 6-12years attended primary school whereas 33.5% of children aged between 13-18years attended secondary school.

Twenty-two percent of the district population is illiterate with females constituting the highest number. In regard to gender, 19.3% of the males 18 years and above are illiterate and 24.6% of the females 18 years and above were illiterate. In terms of illiteracy in the different age groups, illiteracy is higher among the older persons above 60 years at 51.5 %, followed by persons aged 10-17 years (13.9 %) and least among the persons aged 18-30 years (12.0%).

6.1.4 Ethnic Composition



The cultural heritage of Kalungu District is associated with the Baganda tribe being the dominant among other tribes in that area. Others are Banyarwanda at 7.5% and Banyankole at 3.3%. Most of the tribes practice Buganda culture. The Kiganda culture like many tribes in Uganda has their

leader as a king Known as the Kabaka, leader of all the Baganda people and the language spoken is Luganda a very common language in the whole of Uganda.

6.1.5 Land Use and Land Tenure

The land tenure system is an arrangement that determines and regulates ownership and utilization of land. According to Article 237 of the 1995 Constitution, land in Uganda belongs to the citizens of Uganda, and is vested in them in accordance with the following land tenure systems: Customary, Mailo, Leasehold, and Freehold. During stakeholder engagement, it was reported that much of the land is Mailo. Other land tenure system includes; leasehold and freehold. It was also reported that some land belongs to the Buganda Land Board and religious institutions. Majority of the people engaged reported that they live on the land as tenants (Bibanja holders).

Land use in the project affected sub-counties of Bukulula, Lwabenge, and Lukaya Town Council have been described in the Figure 6-1 below;

Land use	Photographs
<p>Settlement: Majority of the people live on the land and most of the settlements are concentrated in the trading centers and along the different roads. Settlement are sparse in the villages.</p>	 <p>Settlements in the project areas</p>
<p>Farming: The land in the project affected sub-counties have utilized for both crop farming and livestock. The major crops grown include: coffee, passion fruits, watermelons, maize, beans, bananas, tomatoes and rice (wetland). Livestocks include cattle, piggery and goats and birds.</p>	 <p>Cattle grazing in Bulingo swamp</p>

<p>Private forest of euclyptus trees and other species have been planted especially on National Forestry Authority land (NFA) like Bugonzi Central Forest reserve.</p>	
<p>Educational and religious institutions: Educational institutions such as pre schools, primary schools, secondary schools and tertiary institutions have been developed on land. According to the Kalungu District website: https://kalungu.go.ug/content/education the district has over 220 schools (pre school, primary schools and secondary schools) and they include; St Jude Kisawo, Kalangala, and Bukulula Mixed, in Bukulula Sub-county, St Kizito Lwengo, Kyagambiddwa Moslem and Kinoni Moslem in Lwabenge Sub-county, Bajja, Kapere Parents and St Jude Lukaya in Lukaya Town Council.</p> <p>The district hosts different religious institution such as the Roman Catholic Church, Anglican, Pentecostal, Islam and Seventh Day Adventist (SDA) among others. These institutions have established infrastructures such as worship centers, health unites, educational institutions and charitable organizations.</p>	
<p>Health facilities: There were a number of health facilities that have been established in the project areas. According to the National Health Facility Master List, 2017 Kalungu District had 34 health units, both government and private. Bukulula Health Centre IV, Lukaya Health Centre III, St. Agnes Kasanje Health Centre II and Kabungo Health Centre III among others.</p>	
<p>Civic: The land has been used for civic which houses Kalungu District Headquarters, Bukulula, Lwabenge, headquarters and Lukaya Town Council headquarters.</p>	<p>Bukeeri Health Centre III</p>


<p>Recreational facilities: These include hotels, guesthouses and lodges and playgrounds attached to educational institutions. These are scattered in the allover the district.</p>	
<p>Road Networks: The district has a total length of 359.7km of road of which 309.5 km are earth and 50.2 km are gravel.</p>	 <p>Access roads in the project area</p>

Figure 6-1 Land use Bukulula and Lwabenge Subcounties and Lukaya Town Council

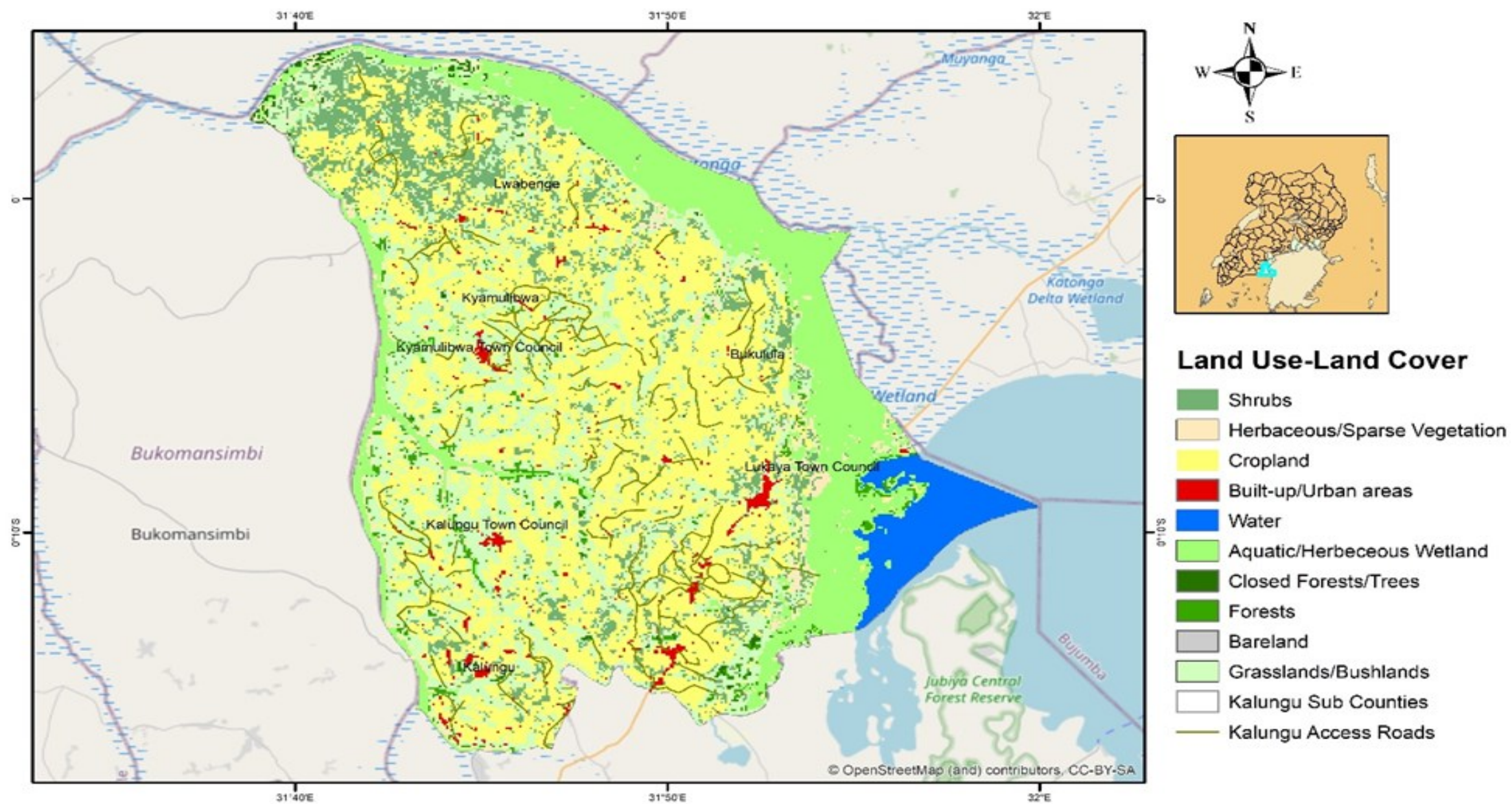


Figure 6-2: Land use in Kalungu District

6.1.6 Economic Activities

The main economic activity in the District is agriculture followed by the service sector, trade and least is manufacturing.

6.1.6.1 Agriculture

The main economic activity in Kalungu District is agriculture. The households mainly practice subsistence farming. According to the District Development Plan (2015/2020), the sector contributes 72.8% of the income to the district. Furthermore, approximately 69% of the population in the district is engaged in agriculture which includes crop farming, livestock keeping, poultry keeping, fish farming and bee keeping. Those involves crop farming (95%), livestock rearing (43%) and poultry keeping (33%). The major crops grown in the project affected sub-counties include; coffee, beans, cassava, sweet potatoes, bananas, maize, finger millet, sorghum, Irish potatoes and rice and livestock include cattle, pigs, goats, sheep, rabbits and donkeys.

6.1.6.2 Trade

Business activities are visible mainly in the established trading centers and gazetted market areas. A few households earn income through the sale of general merchandise, vehicle mechanics, Groceries, welding, eateries, provision of accommodation, transport, saloons, tailoring etc., and vending. The district has two livestock markets namely Kabale in Kibisi Parish and Birongo in Kiragga parish both in Lwabenge Sub-county. Other markets include; Lukaya Highway Market and Lukaya Daily Markets.

6.1.6.3 Fishing

There are some households who derive their livelihood from fishing activities along the shores of Lake Victoria in places such Kamuwunga in Lukaya Town Council, Bulingo and Kalangala both in Bukulula Sub- County. Fishing supplements income from crop farming for participating households.

6.1.6.4 Industry

Most of the industries in the project areas are agro-processing such as coffee mills, maize mills among others which are scattered all over the project affected sub-counties.

6.1.7 Employment

Understanding the livelihood and employment opportunities available in a given settlement is very important. This gives one an idea on the affordability levels for various goods and services as well as appropriate interventions that can work to improve lives in general. Kalungu district is described as a natural resource-based economy with over 80 percent of the rural households engaged in subsistence agriculture as a major activity and source of employment.

6.1.8 Health

Kalungu District has no government hospital and in the three (3) sub-counties of Bukulula, Lwabenge and Lukaya TC covered during the ESIA, it was noted that there is pressure on the existing health facilities that are mainly Health Centre II (HC II) and Health Centre III (HCIII), drug shops, clinics and to a less extent traditional birth attendants. Below is a table showing health centres of different levels in the district.

Table 6—2 Health facilities in Kalungu District

Status	Government	Non-Government	Total
Hospital	0	1	1
Health Centre IV	1	1	2
Health Centre III	8	4	12
Health Centre II	3	12	15
Registered Clinics	0	20	20
Registered drug shops	0	16	16

Source: Kalungu Health Dept 2019

People rely on these facilities despite being poorly facilitated in terms of staff, drugs, and modern diagnostic facilities. Because of the above, patients are often referred to HC VI and nearby hospitals like Villa Maria and Masaka Regional Referral. Overall, facilities are overstretched and inadequate as they are characterized by inadequate stock of drugs, lack of qualified medical personnel, and lack of modern facilities for proper diagnosis. The major health concerns in the proposed project area include malaria, water borne Diseases such as diarrhoea and dysentery, and respiratory infections and HIV/AIDS.

Table 6—3: Health centres in the project area

Sub-county	Name of health facility	Level/category	Ownership
Bukulula	Bukulula	HC IV	Government
	Kalungi	HCIII	PNFP
	Kiti	HC III	Government
	Wellsprings	HC III	PNFP
	Theresa Ledchwoska	HCII	PNFP
Lukaya TC	Lukaya HC III	HCIII	NGO
	Tender Hands Clinic	HCII	PFP
	Mukwano Clinic	HC II	PFP
	St. Joseph's Clinic	HC II	PFP
	Teguzibirwa Clinic	HC II	PFP
	St. Francis Clinic	HC II	PFP
Lwabenge	Kasambya Health Centre	HC III	Government
	Kiragga Health Centre	HC III	Government
	St. Monica Birongo	HC III	PNFP
	Kigaaju Health Centre	HC II	Government

Source: Kalungu District DDP

Malaria is among the communicable diseases that account for over 50% of the total disease burden in Kalungu District (Health dept, 2019). A study on malaria and diarrhoea by the Kalungu Health Department, showed that malaria is more prevalent in persons aged 0-4 years (31%) than diarrhoea (9%) for the same age group. In Lukaya TC, malaria prevalence rate for ages 0-4 years was 32% and 26% for persons aged five and above.

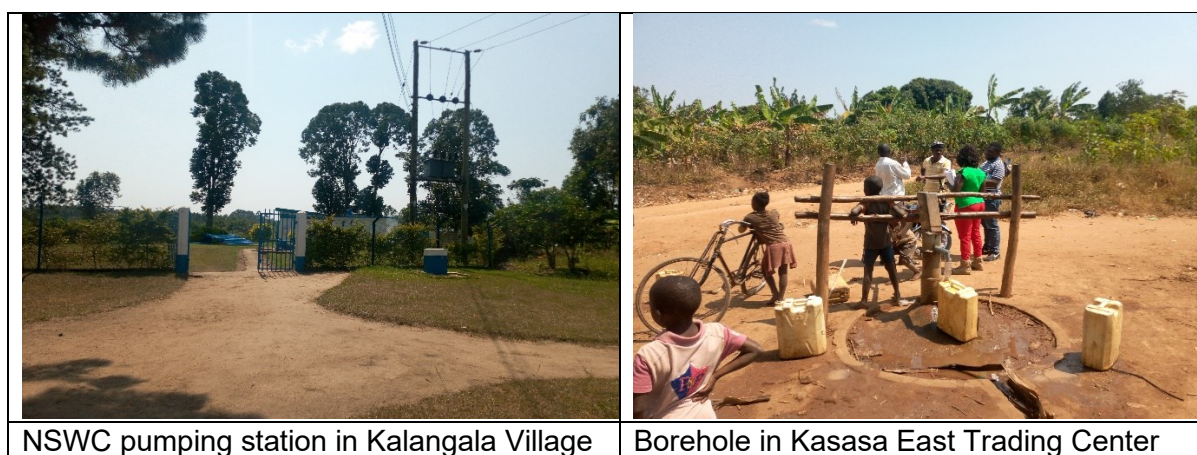
6.1.9 HIV/AIDS

Like many districts of the central region, the HIV prevalence among the general population of Kalungu is estimated to be at 13% however, it is much higher in some areas like fisher folks. This is due to various factors including the increasing number of sex workers who target long truck drivers in Lukaya town council, sexual abuse, limited health services, and limited sex education among others.

6.1.10 Availability and Access to Water

The safe water access rates in Kalungu District vary from 88 % in Lwabenge Sub-County to 95 % in Lukaya Town Council. Kalungu has 1,006 domestic water points which serve a total of 184,536 people 146,670 of them being rural dwellers. The district has 2 piped water schemes one in Kalungu TC and another in Lukaya TC.

Across Kalungu District, 23% of the households cover less than 0.5 km to access water for various uses (KDSE, 2014). More than 43% of households cover 0.5-1.5 km, 21% cover 1.5-3 km, and less than 13% cover less than 3 km distance to access water. During the site visit, majority of the households use from boreholes. Other sources of water observed were protected springs/wells and lake water especially for communities living in landing sites of Kamuwunga, Bulingo and Kalangala (Figure 6-3).



NSWC pumping station in Kalangala Village

Borehole in Kasasa East Trading Center

Figure 6-3 Some of the water sources in Kalungu District

Poverty and livelihood studies revealed the need for safe water to be considered as priority investment. Allocation of water sources has been based on participatory identification of critical needy areas supported by situation/ mapping data from the department of water.

6.1.11 Sanitation

Proper household sanitation and hygiene is still a challenge in some parts of Kalungu especially urban centers like Lukaya and Kalungu Town. There are still homesteads without pit latrines. Majority of homesteads lack basic sanitary facilities like garbage pits, dry racks and clean compounds. During the site visit, it was observed that in most of the urban centers, household dump solid wastes along the road sides and in the drainage channels while in the rural areas, solid wastes are dumped and scattered in the gardens to act as manure whereas others dump in the pits.



Figure 6-4 Solid wastes dumped in Bajja Village in Lukaya Town Council

Due to the low relief and shallow groundwater table in Lukaya TC, majority of sanitation facilities are elevated pit latrines. Proper methods of emptying these pit latrines are not used with waste being discharged into streams during rainy seasons. Because of this unsustainable way of waste discharge, by-laws have been proposed for proper waste management, which include an appeal for an emptying vehicle to reduce on associated health risks.

6.1.12 Transport and Communication

Roads attract priority attention by Kalungu District local governments in the budgets. While the district maintains feeder roads, Sub-County Local Governments are responsible for the community access roads and central Government is responsible for the main trunk roads and major inter districts roads, done by the Uganda National Roads Authority (UNRA). Kalungu District has a total length of 359.7 km of road of which 309.5 km (86.044%) are earth and 50.2 km (13.936%) are gravel. Of the earth roads, 2.641% are in good condition while 62.69% are in poor condition while 9.230% of gravel roads are in good condition and 4.726% are in poor condition. Most of these roads are narrow. The mode of transport along these roads boda bodas, a few trucks and salon cars.

The district has no local radio stations but local people listen to the radio stations from the neighbouring districts and far places like Equator, Buddu, Top Radio, Best FM, CBS and Radio West. In terms of telecommunications, the district is served by MTN, UTL and airtel Uganda, However, access to internet services is still very low despite the introduction of mobile internet facilities due to inadequate network connections in the district. Concerning communication, the mobile phone and local council committee are still a main source of information through which people convey news and information and a big number of the people use the two modes of communication.

6.1.13 Energy Sources

The major sources of energy for the residents of Kalungu District include; electricity, charcoal and firewood, petroleum products (fossil fuels) like Kerosene, petrol and diesel. Charcoal and firewood are mainly used for cooking while electricity and paraffin are used for lighting in households and facilities such as shops, health care facilities.

Table 6—4 : Distribution of Household by source of Energy for Cooking and lighting

Energy source used for cooking	Number households	Energy source used for Lighting	Number households
Electricity	742	Electricity	8,166
Gas	129	Gas	203
Paraffin-Stove	635	Paraffin-Lantern	5,233
Charcoal	6,868	Paraffin-Tadooba	25,672
Firewood	32,432	Candles	795
Others	444	Firewood	274
Total	41,437	Others	1,094
		Total	41,437

Source: UBOS 2017

A very small portion of the population of about 5.68% has access to electricity, majority of these are in urban centres like Lukaya, Kalungu TC and Mukoko. Efforts have been made to extend power to the rural communities of Lwabenge and Kalungu Sub-counties however, its use is minimal, as the population cannot afford the rates. However, there is a gradual increase in the use of solar power in the rural communities. Therefore, there is need to advocate for this renewable energy source in order to minimize on fuel wood consumption. Use of biogas, wind energy and other renewable energy forms are not yet developed in the project area.

6.1.14 Ecosystems Services and their Value

A number of benefits and useful resources are obtained from the ecosystems and landscapes that will be impacted by the proposed oil palm development project in the district. These benefits and resources are collectively referred to as ecosystem services. They include provisioning services, regulating services, supporting services and cultural services (USAID, 2016). The key ecosystem services generated by the proposed project impact area include provisioning services with respect to food production, water supply, provision of non-timber forest products including fuel-wood and various non-wood forest products, fibre, fish and traditional medicines. The regulating and supporting services included carbon capture and storage, habitat values, water quality and purification, pollination, water storage and recharge, flood control and maintenance of soil fertility. Cultural services on the other hand included nature-based tourism, spiritual well-being, aesthetics and research.

The ecosystem service value estimates associated with the wetlands and swamp forest systems in Bukulula, Kalungu, Kyamulibwa and Lwabenge Sub-counties in Kalungu District were based on the Ministry of Water and Environment Study of the economic value of the biodiversity and ecosystem services in the Lake Nabugabo Wetland Complex and Ramsar site undertaken by the ministry in 2015 (MWE, 2015). The value of ecosystem services that will be impacted by the proposed project were US\$ 162,000 for capture fisheries per year, US\$3,516,000 for wood based energy and timber in a year, US\$180,000 for non-wood/non fish wetland products, US\$ 54,000 support to livestock production, US\$ 615,000 pollination, seed dispersal and pest control, US\$5,277,000 for water storage and recharge, US\$3,768,000 for regulating water quality, US\$492,000 for flood attenuation, US\$72,000 for carbon capture and storage and US\$663,000 for nature based tourism all on an annual basis (MWE, 2015).

The ESMP will aim to maintain or increase these levels of ecosystem resilience and productivity.

6.1.15 Settlement Patterns

A number of settlement patterns were observed in the project area. Settlements are linear along the main Masaka-Kampala Road, a section of which traverses the project area. This similar linear pattern was observed along Kalungu - Lwabenge Road with pockets of nucleated settlements in some upcoming rural growth centres.

In villages such as Kalangala which slopes towards the shores of Lake Victoria, settlements were observed to be more on the upper/higher side whereas the lower section was used mainly for crop farming. On the other hand, in Lwabenge Sub-County which is more rural compared to Bukulula, settlements were scattered which is typical of rural areas. Vast areas appeared vacant although some were low lying while others were said to be ranches for cattle keepers.


Regarding housing characteristics, structures were dominantly permanent made of brick and mortar walls and roofed with iron sheets. A few temporary structures were observed in a fishing village in Kalangala.

6.1.16 Archeological and Cultural Heritage Assessment

The proposed project is expected to take place in selected subcounties (Bukukula, Lwabenge and Mukukula) in Kalungu District. Physical Cultural Resources assessment surveys were carried and baseline findings shown in Table 6-5.

Table 6—5: Archaeological and cultural heritage baseline findings in Kalungu District

Bukulula Sub County		
01	Archaeological and cultural heritage survey was conducted mainly in the villages of Nakiga and Bulingo in Lukaya parish. No any significant archaeological and cultural heritage resources were recorded. Prayer centres and burial sites that fall in the project area were found out that the specific project have a very low impact on them and can coexist with the project. In regards to archaeological remains that usually fall below the surface, the project is expected to have a great impact on them.	
Lwabenge Subcounty		
02	Archaeological and cultural heritage survey was conducted in the parish of Kiranga in the villages of Kirimanyaga, Bulingo and Birogo. No any significant archaeological and cultural heritage resources were recorded. However archaeological resources are expected to be exposed during the project implementation phase.	
Mukulula Sub County		
03	Site Name	Bazanya ne Ngo shrine
	GPS coordinates	36M 0375070 UTM 9989305,1151m

	<p>Baseline condition and significance</p>	<p>This site was recorded in Kakwanzi village, Kiti Parish, Mukulula Subcounty in Kalungu District. The Shrine is believed to accommodate several spirits such as Bamweyana, Mizimu, Lubowa, Ndaula, Muwanga, Ssewamala, Jaja Kitinda. According to the custodian of the Shrine, Lubega Hassan several people all over the country come to seek healing and cleansing from the shrine. The shrine is located in the project area and could be affected by lack of privacy and cutting down of culturally significant trees and herbs in the area which are important in the traditional healing practices.</p>	 <p>Bazanya ne Ngo shrine in Kakwanzi Village</p>
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6.1.17 Gender issues

One critical gender concern is major poverty in its varying dimensions. The major poverty determinant is lack of sustainable source of income, food, housing, security of land tenure and social safety having no relatives and friends. The traditional roles of women (Tripple roles) are constantly everywhere and these are mainly reproductive, productive and community actions. In Kalungu the gender-based access and control of resources and benefits varies from one household to another. There are a few cases where women have full access and control over resources such as household assets such as land, livestock and can make decisions over them independent of their husbands. However, the cross-cutting issue is that the community is highly patriarchal in terms of hierarchy. Though the communities are highly sensitized about gender empowerment, the limited visibility of women is partly due to inherent belief that they are a weaker gender despite the environment being conducive for women empowerment. Based on the above analysis, women may require deliberate effort geared toward enhancement of benefits that may accrue from the project and participation in the project.

6.1.18 Vulnerability

A number of people categorized as vulnerable were identified to be in the project area and these included people with disability, the elderly, orphans and vulnerable children, widows and widowers, women because of the patriarchy nature of Ugandan societies, the youth, the poor and the landless. According to Kalungu DDP 2015/2016, the District recognizes that poverty levels are generally higher among women. Consequently, the poverty and livelihood analyses have guided entry points for the district during implementation of poverty alleviation programs. Similarly, NOPP should mainstream issues of marginal groups and devise way of how such groups will benefit from the project.

6.1.19 Energy Sources

The major sources of energy for the residents of Kalungu District include; electricity, charcoal and firewood, petroleum products (fossil fuels) like Kerosene, Petrol and Diesel. Charcoal and firewood are mainly used for cooking while electricity and paraffin are used for lighting in households and facilities such as shops, health care facilities.

Table 6—6: Distribution of Household by Source of Energy for Cooking and Lighting

Energy Source Used for cooking	Number Households	Energy Source Used for Lighting	Number Households
Electricity	742	Electricity	8,166
Gas	129	Gas	203
Paraffin-Stove	635	Paraffin-Lantern	5,233
Charcoal	6,868	Paraffin-Tadooba (wick lamp)	25,672
Firewood	32,432	Candles	795
Others	444	Firewood	274
Total	41,437	Others	1,094

/		Total	41,437
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Source: UBOS 2017

A very small portion of the population of about 5.68% has access to electricity, majority of these are in urban centres like Lukaya, Kalungu TC and Mukoko. Efforts have been made to extend power to the rural communities of Lwabenge and Kalungu Sub-counties however, its use is minimal, as the population cannot afford the rates. However, there is a gradual increase in the use of solar power in the rural communities. Therefore, there is need to advocate for this renewable energy source in order to minimize on fuel wood consumption. This will go a long way in reducing the carbon foot print of the proposed project. Use of biogas, wind energy and other renewable energy forms are not yet developed in the project area.

6.1.20 Transport and Communication

Roads attract priority attention by Kalungu District local governments in the budgets. While the district maintains feeder roads, Sub-County Local Governments are responsible for the community access roads and central Government is responsible for the main trunk roads and major inter districts roads, done by the Uganda National Roads Authority (UNRA). Within the district is 3km of bitumen roads and 208.9 km of gravel roads maintained by Uganda National Roads Authority (UNRA).

Concerning communication, the mobile phone and local council committee are still a main source of information through which people convey news and information and a big number of the people use the two modes of communication.

6.1.21 Security

Security situation within Kalungu District and the affected sub counties was reported by the stakeholders to be good although in the recent past fears were reported to emanate from the rampant murders in the neighbouring Masaka District. During the stakeholder engagement, it was reported there are cases of crimes such as, theft, night robberies, and vandalism. Other cases reported include domestic violence, defilement, and rape. Security in the area is manned by the Uganda Police. Other government appointees such as the RDC, GISO and PISO all contribute to ensuring that the area is secure. It was reported that in towns such as Lukaya and Kalungu, some private security firms are assigned to guard private residences, business premises and public places.

6.1.22 Civil Society Organizations (CSOs)

Kalungu has several registered Non-Government Organizations (NGOs) and Community Based Organizations providing different services to different categories of people. Below are some of the NGOs/CBOs operating within the boundaries of the district.

Table 6—7: Some of the NGOs operating the Kalungu

Name of Organization	Activity
Kalungu NGO Forum	Kalungu NGO Forum is the Umbrella body for all Civil Society Organisations (CSOs) that is Non-Governmental Organisations (NGOs) and Community-Based Organisations (CBOs) operating in Kalungu District, Uganda, East Africa. We inspire and strengthen social, economic and humanitarian service delivery of CSOs in Kalungu District to ensure sustainable development.
Uphold The Needy Uganda (UTNU) Limited.	UTNU works on the socio-economically disadvantaged groups of women, youth and children, elderly and marginalized people. Main areas of focus include; economic empowerment, food security and nutrition, entrepreneurship and value chain and market linkages.
St. Joseph of Good Shephard Kyamulibwa NGO Health Centre IV	Its main objective was to bring health services to the people and to save people from long distances seeking medical services from Masaka or Villa Maria but get services from nearby. Its mission is to provide holistic health services to the poor without discrimination in line with the mission and vision of the Roman Catholic Church's mission in health.

6.1.23 HIV/AIDs

Like many districts of the central region, the HIV prevalence among the general population of Kalungu is estimated to be at 13% however, it is much higher in some areas like fisher folks. This is due to various factors including the increasing number of sex workers who target long truck drivers in Lukaya town council, sexual abuse, limited health services, and limited sex education among others.

6.1.24 Urbanization and Development

The urban centres of Lukaya, Kalungu, Kyamulibwa and Mukoko have become the primary magnet for rural urban migration because of employment opportunities, business attractions, and availability of relatively better infrastructure (schools, health, Roads, electricity and communication). The district has three (3) Town Councils and 2 Town boards that need urgent proper physical planning to guide development.

6.2 Physical Environment

6.2.1 Climate and Climate change

According to the District Development Plan (2015/2016 to 2019/2020), the climate of Kalungu District is almost semi-arid in areas of Lwabenge, some parts of Kyamulibwa and Kalungu Sub-counties. The rainfall pattern is bimodal having two seasons with dry spells between July and August, and January to March. The months of March, April and May receive relatively heavy rainfall which is not well-distributed.

The second season occurs in the months of September to December. Generally, Kalungu District is dry, with Lwabenge Sub- County being the driest.

Long term mean annual rainfall ranges from 709 to 890 mm. Monthly rainfall peaks are 168 mm (April) and 108 mm (October). Lukaya is within a region where potential evapotranspiration has been estimated to range from 1,350 to 1,750 mm per year (NWRA, 2013). Monthly minimum temperatures range from 10 to 16 °C and maximum temperatures from 16 to 25 °C.

6.2.2 Soils and Geology

6.2.2.1 Geology

The geology of the selected sub counties consists of precambrian gneisses and granites. This geology manifests as lateritic soils and clays /sands. These geology types are not known to have any effects on sustainability of oil palms.

The water storage/seepage characteristics of soils and other rock derivatives like laterite could have different behavior on the root anchoring of oil palm trees but not the underlying parent rock. These have been perceived to be generally classified as geological effects yet they are not.

It is hereby emphasized that the sustainable growth of oil palms is dependent on common agricultural practices like planting with right soil thickness, ensuring the right amount of soil at the stump of the adult oil palm tree, addition of the right number of fertilizers and soil testing and not any underlying geology type. Soil test results are provided in Appendix 5.

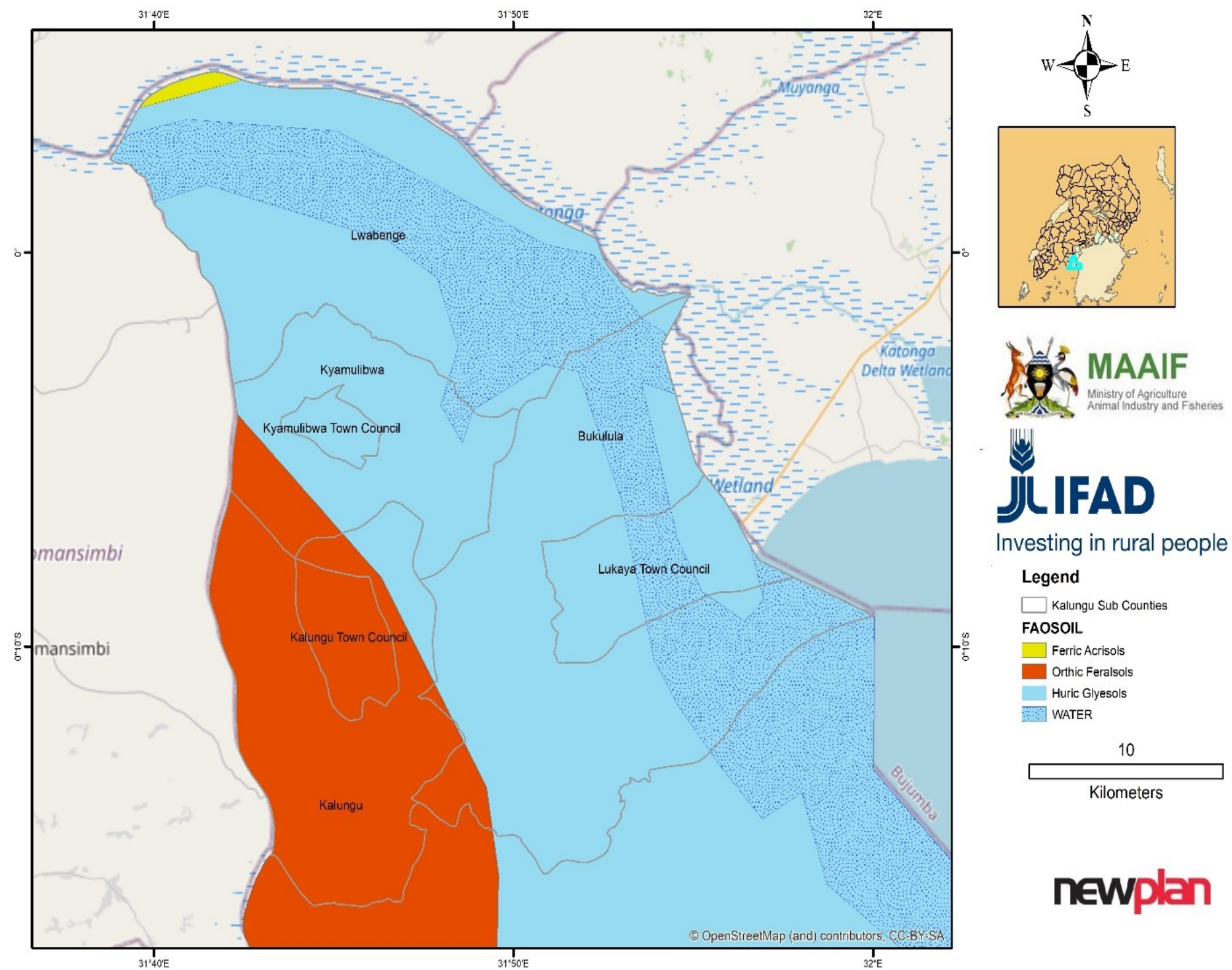


Figure 6-5: Map showing soils and geology of Kalungu District

6.2.3 Topography

The district has a total area of approximately 835.97 km² (about 167,193 hectares). The landscape and topography of the district is generally rolling and undulating (Figure 6-6) with vertical gully heads and valley bottom swamps including streams flowing to the lake and rivers. Most parts of the district are dotted with the hills. It is estimated that about 8% of the district land area is covered by wetlands.

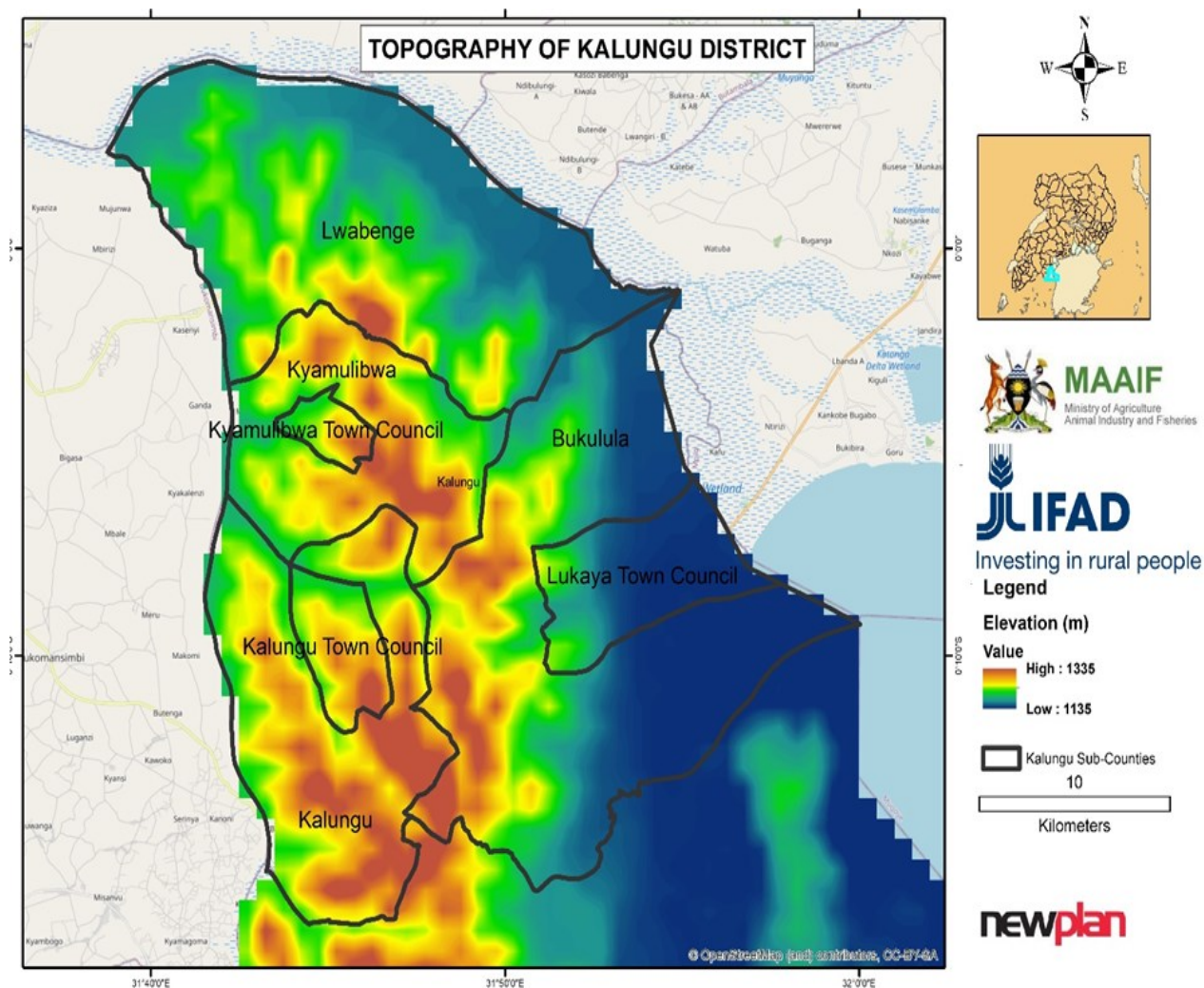


Figure 6-6: Topography of Kalungu District

6.2.4 Hydrology and Drainage and Water Quality

During the rainy season, Kalungu District receives a huge amount of water that flows through streams to Lake Victoria and River Katonga. It is the streams that drain the district. Figure 6-8 shows the hydrology of Kalungu District. Appendix 8 shows laboratory results of water samples tested.

Table 6—8 Areas of hydrological and water quality importance in Kalungu District

Features	Observations
Lakes	Bukulula Sub-County: Lake Victoria
Rivers/streams	Bukulula Sub-County: Kyulwe, Kanwa, Katindo Lukaya Town Council: Katonga
Wetlands	Bukulula Sub- County: Bulingo A, Kalangala wetlands
Water use and water sources for local communities	Lake, boreholes, protected and unprotected springs and water wells

6.2.4.1 Vulnerable and sensitive locations

The most sensitive locations that will be receptors of project impact on water quality, degradations and hydrology changes such as sediment loads by the proposed project were sampled (Table 6-9), and results of water quality analysis are presented in section

Table 6—9 Wetlands in the project area in the project area

	Location	Field Observations
1	Bulingo wetland, Mukoko Parish, Bukulula Sub-County	Longitude 31.877148 Latitude -0.170478 Altitude 1114 m.a.sl
		Rice farms border lake wetland
2	Kalangala wetland Mukoko Parish Bukulula Sub- County	Longitude 31.898255 Latitude -0.187437 Altitude 1117 m.a.sl
		There are agriculture activities with crops like bananas, passion fruits etc.

Rivers and streams that can be storm water drainage channels that are being depended on by local communities were sampled (Table 6-10).

Table 6—10 Rivers in the project area

3	Rivers connecting to Lake Victoria	
	(i)	
	Kyulwe River Gogwe Village Bugonzi Parish Bukulula Sub- County	Longitude 31.854739 Latitude -0.242375 Altitude 1153 m.a.sl
	(ii)	
	Kanwa River Gogwe village Bugonzi Parish Bukulula Sub- County	Longitude 31.855830 Latitude -0.250700 Altitude 1141 m.a.sl

Pictorial evidence of locations on the sensitive river and lake ecosystem is given below:

(i) Rivers draining into Lake Victoria

Kyulwe River,
Gogwe Village,
Bugonzi Parish,
Bukulula Sub- County

Longitude 31.854739
Latitude -0.242375
Altitude 1153 m.a.sl



(ii) Wetland areas

Bulingo Wetland,
Mukoko Parish,
Bukulula Sub- County

Longitude 31.877148
Latitude -0.170478
Altitude 1114 m.a.sl



(iii) Ecological water needs

Cows drinking water in a stream near Kalangala community lake site, Mukoko Parish, Bukulula Sub-County, Kalungu-District

Longitude 31.877148

Latitude -0.170478

Altitude 1149 m.a.sl





124

6.2.4.2 Air Quality

From the Air quality data recorded in Table 6-6, all the values for all the sample points were within permissible limits as per the Draft National Ambient Air Quality Standards of 2006.

However, during project implementation, air quality is anticipated to deteriorate with an increase in values of particulate matter and gaseous emissions. This is because of different activities such as construction of access roads, increase in traffic, land preparation construction and operation of mill. This is evident from benchmarked values of particulate matter and gaseous emissions recorded at an existing Oil Palm Project in Kalangala (Table 6-11).

Table 6—11: Ambient Air quality values at selected points in Kalungu District

Point	Gaseous Components									Particulate matter		GPS Coordinates (UTM) 36M	
	SO2 ppm	NO2 ppm	NO ppm	CO ppm	CH4 % Vol	Oxy %	LEL %	H2S ppm	VOC ppm	PM 2.5/ µg/m ³	PM 10/ µg/m ³	X	Y
Nema Draft Ambient Air Standards	0.5	0.2	0.2	60	-		25		6	25	50		
WHO/IFC Air Quality Standards	0.5	0.2	0.2							25	50		
Pt 1(smallholder farm)	0	0	0	0	0	21.1	0	0	0	Ave-0 Max-0	Ave-0 Max-0	372624	9984 256
Pt 2(smallholder farm)	0	0	0	0	0	20.9	0	0	0	Ave-0 Max-0	Ave-0 Max-0	370651	9984 589
Pt 3(smallholder farm)	0	0	0	0	0	20.9	0	0	0	Ave-3 Max-15	Ave-0 Max-0	368617	9985 423
Pt 4(smallholder farm)	0	0	0	0	0	19.0	0	0	0	Ave-0 Max-0	Ave-0 Max-0	368082	9985 742
Pt 5(smallholder farm)	0	0	0	0	0	20.9	0	0	0	Ave-0 Max-0	Ave-0 Max-0	376622	9989 763
Pt 6(smallholder farm)	0	0	0	0	0	19.0	0	0	0	Ave-0 Max-0	Ave-0 Max-0	376899	9989 685
Pt 7(smallholder farm)	0	0	0	0	0	20.9	0	0	0	Ave-0 Max-0	Ave-0 Max-0	376609	9990 354
Pt 8(smallholder farm)	0	0	0	0	0	21.1	0	0	0	Ave-0 Max-0	Ave-0 Max-0	377228	9990 407

6.2.5 Noise Assessment

From the noise levels recorded in Table 6-12, all the values for all the sample points were within permissible limits as per the National Environment (Noise Standards and Control) Regulations of 2003.

However, during project implementation, noise levels are anticipated to increase. This is because of different activities such as construction of access roads, increase in traffic, land preparation. This is evident from benchmarked values of noise emissions recorded at an existing Oil Palm Project in Kalangala (Table 6-12).

Table 6—12: Noise assessment recorded at selected points in Kalungu District

Position	NOISE MEASUREMENT d(B) A				Permissible limits (dB(A))	SOURCE OF NOISE
	level	Max	Min.	Av.		
Pt 1(smallholder farm)	80	51.6	50.3	50.95	85	Wind, bird calls, Human conversations
	50	47	44.7	45.85		
	30	56.4	40.8	48.6		
Pt 2(smallholder farm)	80	55	52.9	53.95	60	Human conversations
	50	43.5	40.2	41.85		
	30	56.6	49.3	52.95		
Pt 3(smallholder farm)	80	56.8	55.2	56	60	Wind, bird calls, insects chirping, human conversations
	50	50.9	49.9	50.4		
	30	52.5	51.5	52		
Pt 4(smallholder farm)	80	55	52.3	53.65	60	Human conversations
	50	54.2	45.8	50		
	30	60.4	57.9	59.15		
Pt 5(smallholder farm)	80	59.3	58.8	59.05	60	Wind, bird calls, insects chirping
	50	60.6	60.3	60.45		
	30	57.5	48.5	53		
Pt 6(smallholder farm)	80	56.5	51.5	54	60	Wind, bird calls, insects chirping
	50	54.1	46.2	50.15		
	30	52.3	49.6	50.95		
Pt 7(smallholder farm)	80	56.4	54.6	55.5	60	Wind, bird calls
	50	54.8	47.5	51.15		
	30	58.9	54.2	56.55		
	80	56.7	51.6	54.15	60	

Pt farm)	8(smallholder	50	53.2	49.5	51.35		Wind, bird calls, automobiles
		30	57.1	54.2	55.65		

6.3 Biological Environment

6.3.1 Flora

Kalungu District Landscape is defined by mosaics of wetlands covering about 8% (13936 ha) of total land area of 167193 ha of the district, largely dominated by *Cyperus papyrus* and *Phragmites australis* mostly observed in Bukulula, Lwabenge sub county, Kyamulibwa and Lukaya Town councils, seasonal swamps were also apparent on private landscape and valleys; herbaceous vegetation mostly in open flat landscapes and farmlands, and seasonally flooded grasslands especially in the flood plain areas of Bukulula subcounty facing River Katonga Wetland areas; open and wooded grasslands towards the great Katonga wetland Ramsar site, and remnants of tropical forests (local forest reserves) under the management of district forest services that is Kalongo local Forest reserve (17.9 ha), Nabijoka Local Forest reserves (45.4 ha) and Bugonzi Local Forest Reserves (383.8 ha) in Luzira, Bugonzi and Kansambya areas. Currently, the district is dominated by plantation forests of *Eucalyptus* spp and *Pinus* spp, mostly on private lands.

The size distribution of natural forests in the district has significantly reduced over the past decade, with a persistent increase in area under plantation forests. According to the Kalungu District Natural Resources Department (KDNRD), Kalungu had 23700ha of tree cover, extending over 30% of its land area while in 2021, it had lost 292ha of tree cover. Most of the forests remaining are in the protected areas which have been degraded to points of no recovery owing encroachment for subsistence farmlands, sand mining and crop production (Table 6-13).

Table 6—13: Forest Types and Coverage

Type of Forest	Size
Natural Forests	82 acres
Plantations	1806 acres
Central Forest Reserves	497 Hectares
District/Local Forest reserves	76 Hectares

Other vegetation types noted in the district landscape were wetlands both seasonal and permanent, while human settlement and agricultural production explain the reclamation activities in these wetlands. Over 90% of the population of Kalungu depends on forests and trees as fuel wood, furniture and building.

An assessment of the 2021 land cover mapping of Kalungu District (Figure 6-8) showed that, the district has over 34, 645 ha of land under smallholder subsistence farming (Table 6-16). This provides assurance of the availability of land for smallholder adoption of the oil palm project. Table 6-15 shows some of the farm lands in Kalungu District.

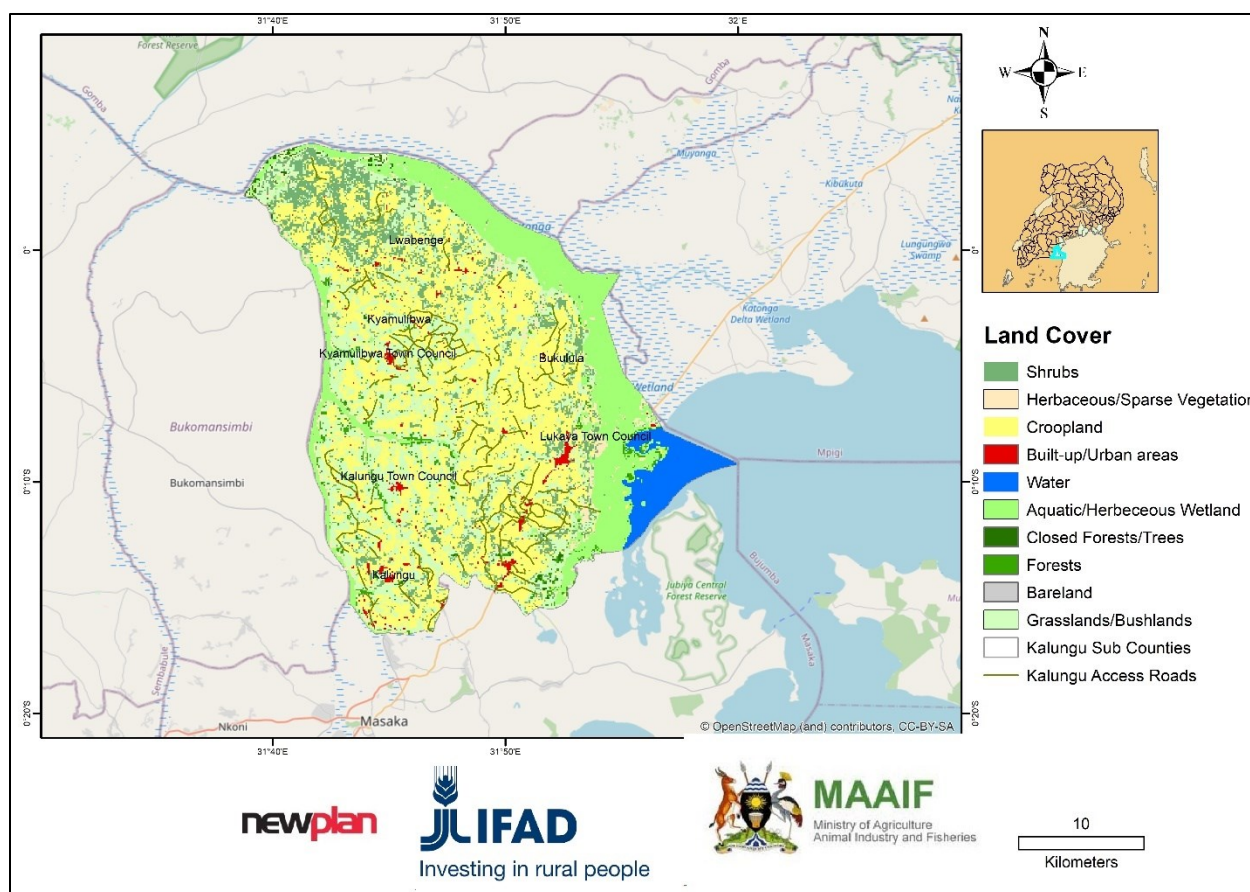


Figure 6-8: Land Use Land Cover Map of Kalungu District.

Table 6—14: Land Cover classification of Kyotera District

Land cover	Area (ha)
Shrubs	8899
Herbaceous/Sparse Vegetation	2354
Crop land	34645
Built-up area	1020
Water/lakes/rivers	6740
Wetlands/Marshlands	10155
Closed forest Canopy	375
Open Forests	3428
Bare land	43
Grassland	15990
Total	83648

Plant species in Kalungu District were recorded in five main habitats namely; grassland, farmland, plantations, marshlands and wetlands. Vegetation communities of trees, shrubs, herbs, Forbes, sedges and grass were recorded in these habitat types.

Grassland

Grassland areas (both open and wooded) were observed on a relatively flat terrain that gently slopes towards low lying areas largely dominated by grass species interspersed with pockets of bushes and thickets. These areas were more apparent in Lwabenge and Bukulula Sub-Counties. The project area was largely dominated with grass species of *Hyparrhenia filipendula*, *Eragrostis pilosa*, *Eleusine coracana*, *Eragrostis olivacea*, *Coix lacryma-jobi*, *Rottboellia cochinchinensis*, *Hyparrhea rufa*, *Chloris gayana*, *Eleusine indica*, *Panicum trichocladum*, *Sporobolus africana*, *Sporobolus pyramidalis*, *Paspalum notatum*, *Cymbopogon nardus* and *Imperata cylindrica* in some areas, but also had some small thickets that were sparsely distributed with shrubs such *Acacia senegalensis* present.

Bushland

Bushy habitats constituted of *Acanthus pubescens*, *Solanum mauritianum*, *Solanecio angulatus*, *Eriosema glomeratum*, *Triumfetta rhomboidea*, *H. rufa* and *Imperata cylindrica*, *Microglossa pyrifolia*, *Acalypha indica* and *Alchornea cordifolia*, inter-twined with several herbaceous weedy species.



Wooded and Open grasslands observed on Bukulula subcounty with *Hyparrhenia hirta* and *Phoenix rectilina* dominant

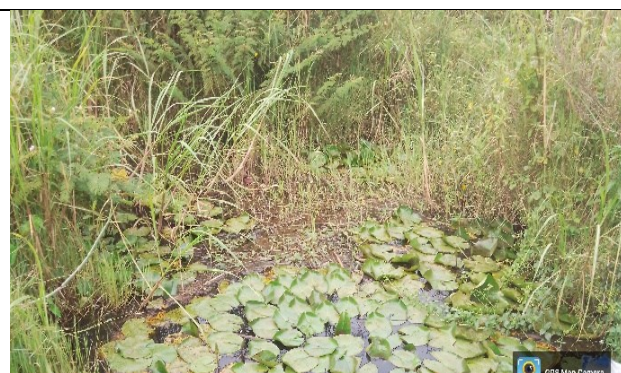
Figure 6-9 : Dominant vegetation types of Kalungu District

Marshland and Wetlands

The marshland and wetland habitats were characterised by grass, herb and sedge assemblages with species such as *Phragmites australis*, *Leersia hexandra*, *Cyperus rotundus*, dominant *Cyperus papyrus* in river Katonga wetland, *Eriosema salignum*, *Aframomum angustifolium*, *Triumfetta macrophylla*, *Bridelia micrantha*, *Capparis erythrocarpos*, *Celosia trigyna* and *Phoenix reclinata*. The wetlands overlapping on private landscapes have been degraded as a result of agricultural land expansion especially within the Lukaya Town Council, with large scale rice farms, and urbanisation. Nabajjuzi wetland system is dominated by *Cyperus papyrus* with patches of *Miscanthus violaceus* in most parts. In the interior are also communities of *Kostchya sp.*, a common shrub in *C. papyrus* swamps. There are also small open water pools supporting *Nymphaea nouchali*.



Cyperus papyrus, *Cyperus melanospermus*, and the Common Reed (*Phragmites australis*) along the franks of River Katonga wetland



Nymphaea odorata, *Tribulus zeyheri*, and *Mimosa pigra* along Katonga wetland in Lwabenge Sub county

Plant species typical of wetlands and marshlands.

Forests, woodlots and plantations

Forests in the area are mostly modified reserves with no central forest reserve but local forest reserves under the management of district forest services include Kalongo local Forest reserve (17.9 ha) found in Kitamba parish, Kalungu subcounty, Nabijoka Local Forest reserves (45.4 ha) in Lukaya TC and Bugonzi Local Forest Reserves (383.8 ha) in Bukulula sub county. Trees and shrubs were recorded (see plant species list attached to Appendix 6), especially in the forest reserves and plantations. Plantations were mostly monoculture woodlots of *Pinus spp* and *Eucalyptus spp*.



Pinus spp woodlot



Eucalyptus spp woodlot

Farmland

Food crops including *Zea mays*, *Brassica oleracea*, *Musa spp* and coffee plantations were cultivated on the farm land in the targeted subcounties. Weeds including *Bidens pilosa*, *C. nardus*, and *O. latifolia*. Shrubs and trees scattered on farm included *Lovoa trichiloides*, *Milicia excelsa*, *Jacaranda mimosifolia*, and *Maesopsis eminii* which was the most dominant tree species. Fruit trees included *P. guajava*, *C. Papaya*, *Citrus limon*, *Citrus sinensis*, *Persia americana*, *Artocarpus heterophyllus*, *Mangifera indica*, *Moringa oleifera*, *Aloe vera*, *Aloe spp*, *Dracaena fragrans* among others.

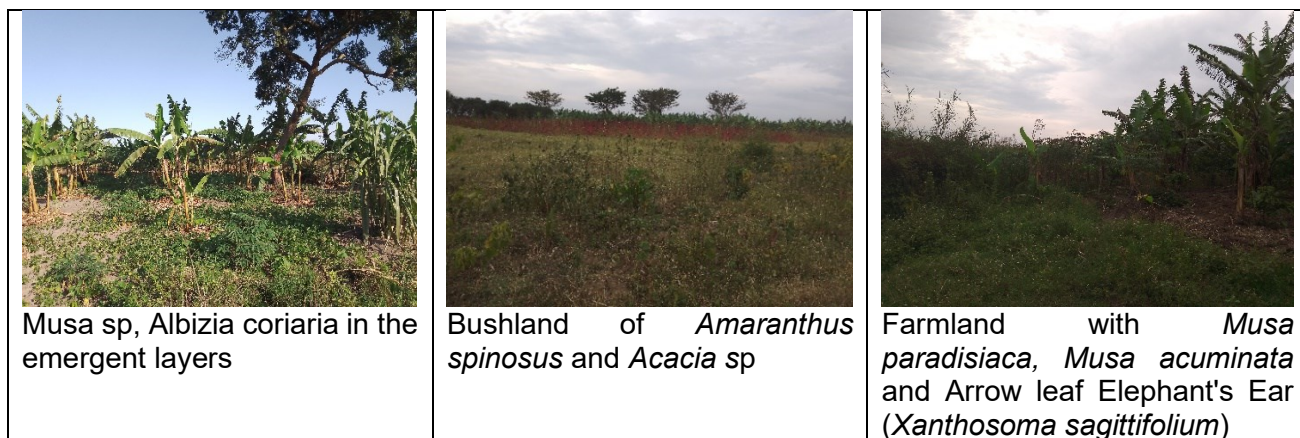











Figure 6-10 Farmland with *Musa* spp, *Amaranthus* spp and *Acacia hockii*


Table 6—15 Some Farmlands in Kalungu District



S/N	Location in Kalungu District	Onsite observations	Photos
1	<ul style="list-style-type: none"> ▪ Bukulula S/C ▪ Mukoko Parish ▪ Kasasa East Village 	Fields predominantly under food crop production with Coffee robusta, banana system, eucalyptus woodlot and maize	 <p><i>Gardens of Eucalyptus grandis, Zea mays and Coffee robusta</i></p>
2	<ul style="list-style-type: none"> ▪ Bukulula S/C ▪ Mukoko Parish ▪ Kasasa East Village 	Fields predominantly under food crop production with Coffee robusta, banana system, eucalyptus woodlot and maize	



S/N	Location in Kalungu District	Onsite observations	Photos
3	<ul style="list-style-type: none"> Bukulula S/C Mukoko Parish Kasasa East Village 	<p>Underutilised Catholic Church land that could provide rural poor associations for farmland access for oil palm growing, under bushes and thickets land cover.</p> <p>Bushes were dominated by <i>Lantana camara</i>, an invasive species, <i>Mangifera indica</i> and <i>Phoenix spp</i></p>	
4	<ul style="list-style-type: none"> Bukulula S/C Kalangala Village 	<p><i>Eucalyptus</i> spp woodlot (376857, 9978723)</p>	 <p><i>Eucalyptus</i> spp woodlot</p>



S/N	Location in Kalungu District	Onsite observations	Photos
5	<ul style="list-style-type: none"> Bukulula S/C Kalangala Village 	<p>Maize (<i>Zea mays</i>) farmland adjacent to access road (375378, 9977055) and a Eucalyptus woodlot to the East of the plot.</p> <p>Farm owned by Namazzi Aisha</p>	 <p><i>Maize</i> farmland and Eucalyptus Woodlot</p>
6	<ul style="list-style-type: none"> Bukulula S/C Kalangala Village 	<p>Freshly ploughed farmland new planted with maize, and a drainage channel separates the farm and access road.</p> <p>Farm owned by Michael Muhinda</p>	 <p>Farmland planted with Maize and <i>Eucalyptus</i> woodlot in the background</p>



S/N	Location in Kalungu District	Onsite observations	Photos
			
8	<ul style="list-style-type: none"> Bukulula S/C Kalangala Village 	<p>Farmland with Ipomea batatus (sweet potatoes), Maize (Zea may) and cassava (<i>Manihot esculenta</i>)</p> <p>Owned by Chairperson-Remegio Kaweesi</p>	 <p><i>Ipomea batatus</i> and <i>Manihot esculenta</i> garden</p>
9	<ul style="list-style-type: none"> Bukulula S/C Mukoko Parish Bugonzi Village 	<p>Farmland dominated by coffee, passion fruit sheds and farm paddocks.</p> <p>Owned by Seif Ssekasamba</p>	 <p><i>Passiflora edulis</i> farmland</p>



S/N	Location in Kalungu District	Onsite observations	Photos
10	<ul style="list-style-type: none"> ▪ Bukulula S/C ▪ Mukoko Parish Bugonzi Village 	<p>Bushland dominated by shrubs</p> <p><i>Mimosa pigra</i> an invasive species was apparent on the site</p> <p>Land owned by Kawuki Badru</p>	 <p>Bushland of <i>Mimosa pigra</i> and <i>Corymborkis corymbis</i></p>
11	<ul style="list-style-type: none"> ▪ Bukulula S/C ▪ Mukoko Parish ▪ Kasasa East Village, Kalangala and Bugonzi Villages 	<p>Community access roads connecting to Bukulula Trading Centre and the Kalungu-Makasa Road</p> <p>coordinates (375688, 9980468); (374859, 9978499); (374823, 9978406); (374640, 9978681); (376456, 9977388)</p>	




S/N	Location in Kalungu District	Onsite observations	Photos
			
12	<ul style="list-style-type: none"> Bukulula S/C Mukoko Parish Bugonzi Village 	<p>Bugonzi Local Forest Reserve with Eucalyptus spp woodlot in pure stands. The understory is dominated by <i>Lantana camara</i>, <i>Sida spp</i>, <i>Bidens pilosa</i>. Sapplings of <i>Markhamia lutea</i> were present.</p> <p><u>Forest boundaries</u> 374498, 9978793; 374223, 9979076; 374518, 9978813</p>	 <p><i>Eucalyptus</i> woodlot, section of Bugonzi LFR</p>



S/N	Location in Kalungu District	Onsite observations	Photos
13	<ul style="list-style-type: none"> Bukulula SubCounty Kalangala Village 	<p>Farmland mainly covered by coffee- banana system with a few scattered trees.</p> <p><i>Khaya anthotheca</i>-VU was maintained on site</p> <p>Site designated for oil palm growing is under annual/seasonal crop farming with <i>Zea mays</i>, <i>Manihot esculenta</i>, and tree species of <i>Eucalyptus grandis</i>, <i>Pinus caribea</i>, <i>Erythrina abyssinica</i>, <i>Mangifera indica</i>, <i>Psidium spp</i>, <i>Persia americana</i>, and <i>Artocarpus heterophyllus</i></p> <p>Grass species recorded at the edges of the site include <i>Cynodon dactylon</i>, <i>Heteropogon contortus</i> and <i>Elymus repens</i></p> <p><i>Khaya anthotheca</i> Was the threatened (VU) species maintained on farm</p> <p>Site Owned by Lule Senkungo</p>	 <p><i>Coffee robusta</i> plantation with emergents of <i>Khaya anthotheca</i></p>  <p><i>Zea mays</i> intercropped with <i>Manihot esculenta</i></p>



S/N	Location in Kalungu District	Onsite observations	Photos
			 <p>Open grassland of <i>Imperata cylindrica</i></p>
14	<ul style="list-style-type: none"> Bukulula SubCounty Kalangala Village 	Vegetation communities mainly bushlands dominated by abandoned <i>Eucalyptus spp</i> woodlot. Other species recorded include <i>Phoenix spp</i> , <i>Cyperus rotundus</i> , <i>Tristemma sp</i> , <i>Clidemia hirta</i> , and <i>Solanum mauritianum</i>	 <p>Bushland dominance of a young <i>Eucalyptus</i> woodlot</p>



S/N	Location in Kalungu District	Onsite observations	Photos
15	<ul style="list-style-type: none"> ▪ Bukulula SubCounty ▪ Kalangala Village 	<p>Coffee plantation on the farm</p> <p>To the lower side of the farmland is a <i>Eucalyptus</i> woodlot at 375687, 9978170, intercropped with <i>Manihot esculenta</i></p> <p>Weeds e.g <i>Bidens pilosa</i>, <i>Centella asiatica</i>, <i>Leonotis nepetifolia</i> were also recorded.</p> <p>Trees on farm included <i>Eucalypts</i>, <i>Persia americana</i>, <i>Mangifera indica</i>, <i>Vangueria apiculata</i> etc</p> <p>Site owned by Joseph Kalema</p>	 <p><i>Coffee robusta</i> plantation</p>  <p><i>Coffee robusta</i> and <i>Eucalyptus</i> sp</p>


S/N	Location in Kalungu District	Onsite observations	Photos
16	<ul style="list-style-type: none"> Bukulula SubCounty Bugonzi Village 	<p>farm is predominantly bushland dominated by grass species of <i>Eragrostis</i> sp, <i>Cynodon dactylon</i>, <i>Phoenix</i> sp and previously used for cattle grazing especially in the open grassland side.</p> <p>Owned by Namujjirwa Juma</p>	 <p><i>Cynodon dactylon</i>, <i>Phoenix</i> sp</p>
17	<ul style="list-style-type: none"> Bukulula SubCounty Kalangala Village 	<p>Open farmland with newly planted with water melon, a few scattered trees of <i>Eucalyptus</i> and <i>Phoenix</i> spp, an indication of water logging conditions on site.</p> <p>Farm owned by Badru Kateregga</p>	 <p><i>Eucalyptus grandis</i>, and Watermelon (<i>Citrullus lanatus</i>)</p>

S/N	Location in Kalungu District	Onsite observations	Photos
18	<ul style="list-style-type: none"> Bukulula SubCounty Kalangala Village 	<p>Open farmland</p> <p>Owned by Cosma Ssendagire</p>	
19	<ul style="list-style-type: none"> Bukulula SubCounty Kalangala Village 	<p>crop land planted with <i>Ipomoea batatas</i>. Other species on site included <i>Phoenix sp</i>, <i>Musa sp</i> and <i>Eucalyptus sp</i></p> <p>The site is owned by Kimera Godfrey</p>	 <p><i>Ipomoea batatas</i> farmland</p> 

S/N	Location in Kalungu District	Onsite observations	Photos
20	<ul style="list-style-type: none"> Bukulula SubCounty Kalangala Village 	<p>opland under coverage of <i>Ipomoea batatas</i>, <i>Musa sp</i>, <i>P.vulgaris</i> and a few scattered <i>Erythrina abyssinica</i> trees.</p> <p>Farm owned by Agnes Nalumansi</p>	 <p><i>Musa sp</i>, and <i>Phaseolus vulgaris</i></p>  <p><i>I.batatas</i> garden</p>

S/N	Location in Kalungu District	Onsite observations	Photos
21	<ul style="list-style-type: none"> ▪ Bukulula SubCounty ▪ Kalangala Village 	<p>Newly ploughed field planted with Water melons</p> <p>Farm Owner- Mr. Kayanja</p>	
22	<ul style="list-style-type: none"> ▪ Bukulula SubCounty ▪ Kalangala Village 	<p>Open field under cultivation with scattered Phoenix sp trees</p> <p>The site is owned by Ponny Namuwawu</p>	

S/N	Location in Kalungu District	Onsite observations	Photos
23	<ul style="list-style-type: none"> Bukulula SubCounty Kalangala Village 	<p>Farmland dominated by bushland with <i>Bidens sp</i>, <i>Phoenix sp</i>, <i>Amaranthus sp</i>, <i>Acalypha sp</i>, for most of the part but also with newly planted coffee sections. Trenches for water drainage</p> <p>Site owned by Muyanja Charles</p>	
24	<ul style="list-style-type: none"> Bukulula SubCounty Bugonzi Village 	<p>Farmland opposite Bugonzi Local Forest Reserve, largely dominated by both annual and perennial crops of <i>I. batatus</i>, <i>Zea mays</i>, <i>P. vulgaris</i> <i>Eucalyptus</i> sp and herbs like <i>Sida</i> sp were recorded on site</p> <p>Site owned by Aloysius Kilangwa</p>	 <p><i>Coffee robusta</i> and <i>E.grandis</i> woodlot</p>

S/N	Location in Kalungu District	Onsite observations	Photos
			

Invasive species

The dominant invasive species on the proposed project farmland were *Lantana camara*, *Oxalis latifolia*, *Senna spectabilis*, *Bidens pilosa*, and *Cynodon dactylon*, while the common water hyacinth (*Eichhornia crassipes*), *Salvinia molesta*, *Setaria verticillate*, *Mimosa pigra* were common in the marshland and wetland areas; open and wooded grasslands and bushlands, were largely dominated by *Cymbopogon nardus*, *Dalbergia sissoo*, *Acacia hockii*, *Leucaena leucocephala*, *Prosopis spp*, and *Chromolaena odorata*.



An overall total of 160 plant species, 94 Genera from 45 families were recorded from the assessment across the Kalungu landscape. Grass, herbs and shrubs were the most evident form (77%) of vegetation communities across the district (Figure 6-11).

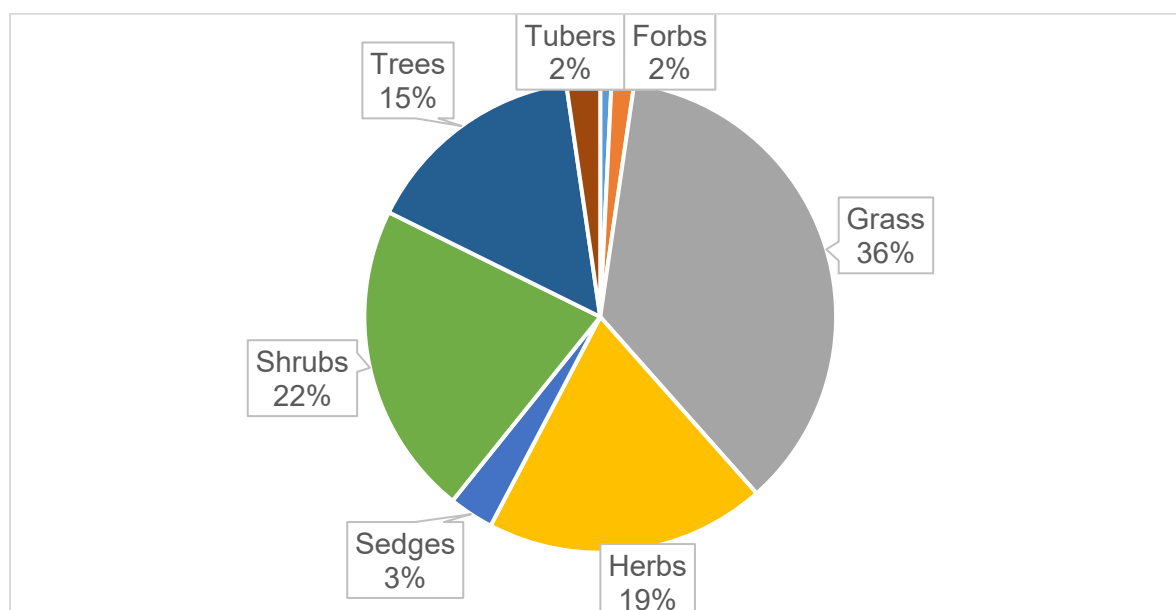


Figure 6-11: Plant life form composition across Kalungu District landscape

The full list of species recorded is attached in Appendix 5. The most common species recorded were *Cynodon dactylon*, *Persea americana*, *Amaranthus hybridus*, *Sida rhomboides*, *Bidens pilosa*, *Eucalyptus grandis*, *Markhamia lutea*, *Panicum maximum*, *Solanum incanum*, *Ageratum conyzoides*, and *Ipomoea cairica*, while *Lantana camara* and *Mimosa pigra* were the dominant invasive species in the landscape. Fifteen invasive species were recorded throughout the landscape. Coordinates of their locations are attached in the Appendix 6.

Species of conservation concern recorded was *Khaya anthotheca* (Vulnerable-VU) in Kalangala Village, Bukulula sub county. Most of these species have been maintained in farmlands, sub county compounds and home gardens. The community understand and value these species, so it is anticipated their population will not be affected by the adoption and implementation of oil palm project.

Ecologically sensitive areas

Environmentally sensitive areas (ESAs) include wildlife habitat areas, steep slopes, wetlands, and prime agricultural lands. When ESAs are interconnected, they could form greenway corridors consisting of networks of linked landscape elements that provide ecological, recreational, and cultural benefits to a community (Ndubisi et al. 2016). The only ESAs observed and identified within the Kalungu landscape were River Katonga and the Nabugabo Wetland System, a Ramsar site (Figure 6-12).

6.3.2 Fauna

6.3.2.1 Birds

The numbers of individuals and species observed in each survey site are shown in Table 6-18. Overall, the avifauna species diversity for all the sites was low. The site in Kalangala registered the highest species diversity due to its heterogeneous nature (riverine forest fringed by farmed lands and settlements). The sites in Lukaya Town Council registered the lowest species diversity as shown in Figure 6-12. This is due to the high extent of habitat degradation and being more of a town setting.

Table 6—16: Avifauna species richness for the surveyed sites

Survey Site	Number of Individuals Observed	Number of Species Represented.
Bukulula Subcounty	140	31
Lukaya Subcounty	35	10
Lwabenge Subcounty	94	21

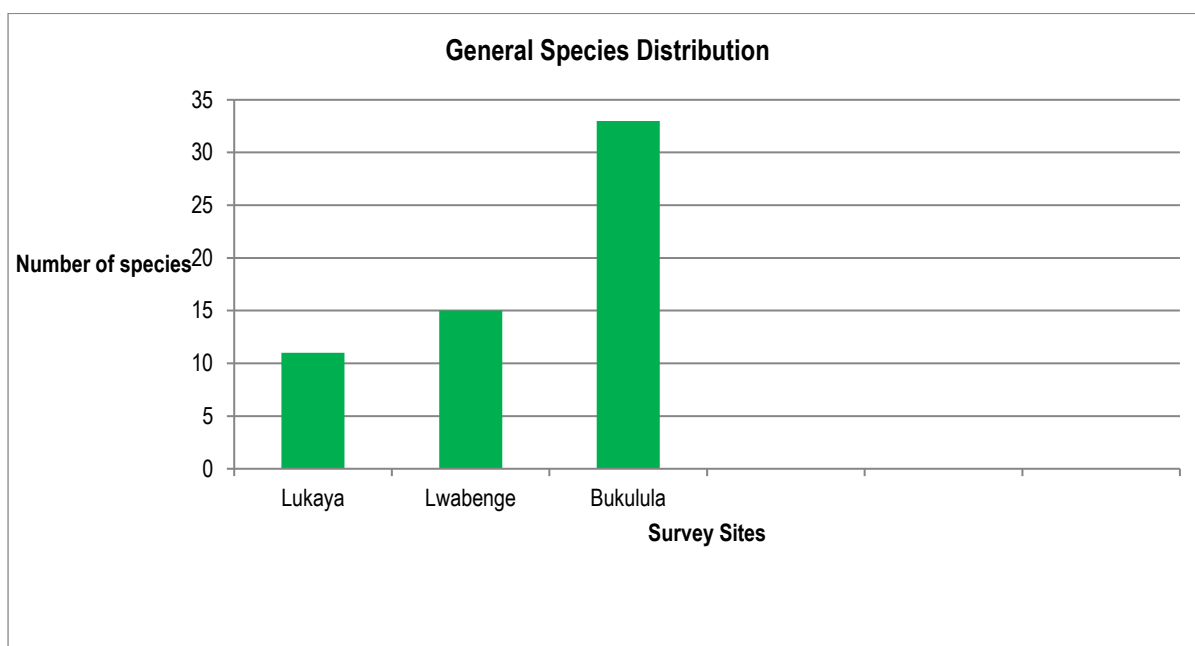


Figure 6-12 Avifauna species diversity according to the survey sites

6.3.2.2 Distribution of avifauna species by Sub-County

Lukaya Subcounty

The most abundant and widely distributed species in Lukaya Sub-County was the Cattle Egret (*Bubulcus ibis*) which represented 25% of all the species recorded here; followed by the Marabou Stork (*Leptoptilos crumeniferus*) at 20% (Figure 6-15).

A forest visitor; the Green-backed Camaroptera (*Camaroptera brachyura*) and two forest generalists, Red bellied Paradise-Flycatcher (*Terpsiphone rufiventer*) and Ring-necked Dove (*Streptopelia capicola*) were observed here. Only one water specialist; Long-tailed Cormorant (*Phalacrocorax africanus*) was observed. One non-water specialist Common Sandpiper (*Actitis hypoleucos*), a non-water specialist water bird, often found by water was also observed.

Most of the species observed are habitat generalists (NF) (Table 6-17). No birds of international conservation concern were recorded here.

Most of the observed species were resident breeders except the Common Sandpiper *Actitis hypoleucos* being a winter visitor and an intra-African breeder, the Marabou Stork *Leptoptilos crumeniferus* a resident breeder as well as an intra-African migrant breeder and the Woodland Kingfisher *Halcyon senegalensis* a regular passage migrant and resident breeder.

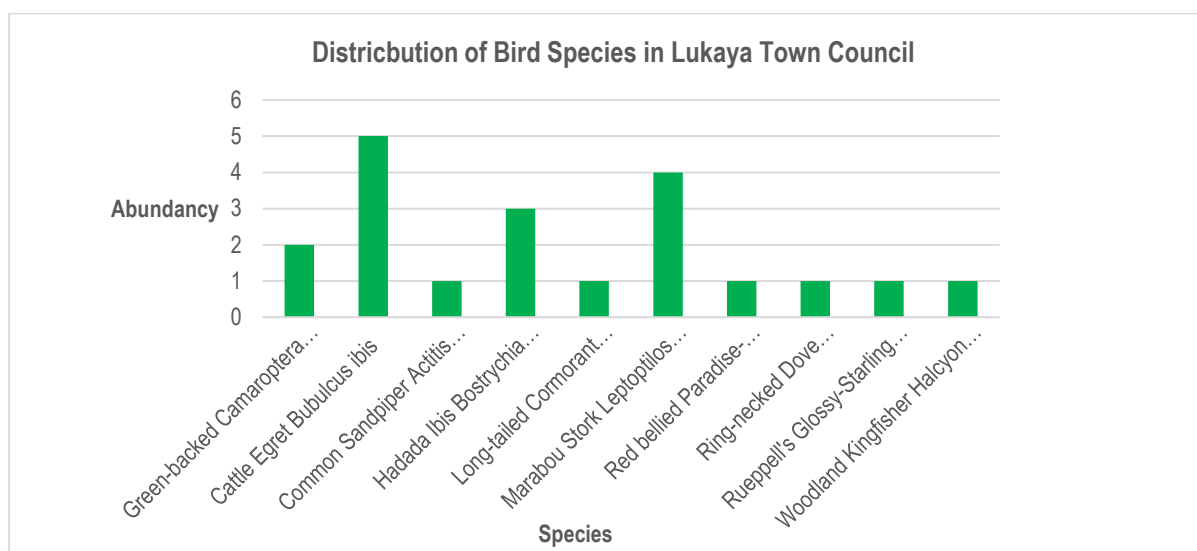


Figure 6-13: Number of species per taxa recorded in Lukaya Town Council

Lwabenge Subcounty Site

The most abundant and widely distributed species was the Speckled Pigeon (*Columba guinea*) at 17% of all species registered for this site, followed by the Marabou Stork (*Leptoptilos crumeniferus*) at 13%; refer to Figure 6-14.

Two forest visitors, the Broad-billed Roller (*Eurystomus glaucurus*) and the Common Bulbul (*Pycnonotus barbatus*), were recorded while no water specialists were observed, two non-water specialist African Open-bill (*Anastomus lamelligerus*) and Little Egret (*Egretta gazetted*) that is usually found next to water but can as well survive where there is no water were also recorded.

Most of the species observed are those referred to as habitat generalists (NF) (Appendix 6-19).

The Grey Crowned-Crane (*Balearica regulorum*) was regionally listed as Regionally Near threatened according to The Bird Atlas of Uganda (Carswell et al. 2007). The Grey Crowned-Crane (*Balearica regulorum*) is listed as Endangered according to the IUCN red list of threatened species 2021.

Most of the observed species were resident breeders except the Black Kite *Milvus migrans* being a resident breeder and regular passage migrant, the African Openbill *Anastomus lamelligerus*, Broad-billed Roller *Eurystomus glaucurus* and the Grey Crowned-Crane *Balearica regulorum* are resident breeders and an intra-African migrant but nonbreeding and the Marabou Stork *Leptoptilos crumeniferus* a resident breeder as well as an intra-African migrant breeder.

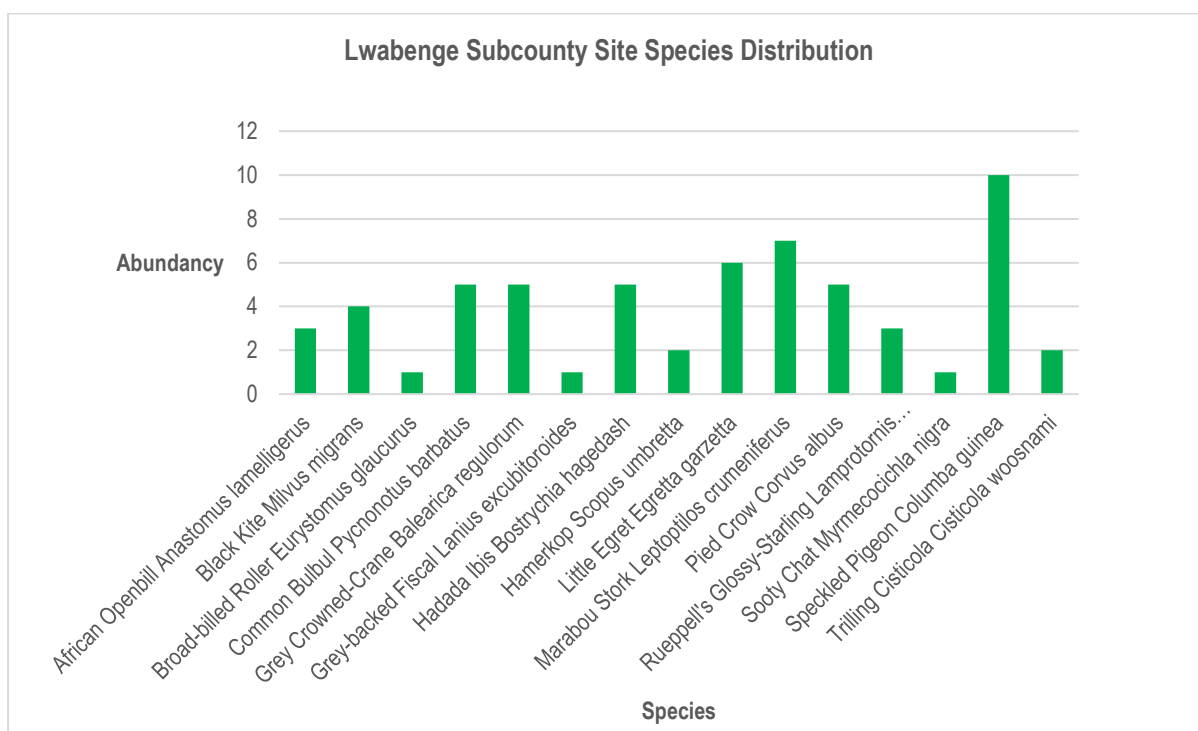


Figure 6-14: Number of species per taxa recorded at Lwabenge Sub-County

Bukulula Subcounty site

The most abundant and widely distributed species was the Common Bulbul (*Pycnonotus barbatus*), comprising 13% of all the species recorded; followed by the Red Eyed Dove (*Streptopelia semitorquata*) at 7% (Figure 6.15).

Forest visitors recorded included Black-and-white Mannikin (*Spermestes bicolor*), Greater Blue-eared Glossy-Starling (*Lamprotornis chalybaeus*), Green-backed Camaroptera (*Camaroptera brachyura*) and the Common Bulbul (*Pycnonotus barbatus*).

Forest generalists recorded included the Ring-necked Dove (*Streptopelia capicola*), Red-eyed Dove (*Streptopelia semitorquata*), Red-chested Sunbird (*Cinnyris erythrocerca*), Great Blue Turaco (*Corythaeola cristata*) and the Beautiful Sunbird (*Cinnyris pulchellus*). No water specialists were observed.

Non-water specialists observed included the Blue-headed Coucal (*Centropus monachus*), African Open bill (*Anastomus lamelligerus*) and African Marsh-Harrier (*Circus ranivorus*). Most of the species observed are those referred to as habitat generalists (NF) (Appendix 6-19).

Regionally Near Threatened species observed included the Grey Crowned-Crane (*Balearica regulorum*) and the African Marsh-Harrier (*Circus ranivorus*). The Grey Crowned-Crane (*Balearica regulorum*) is listed as Endangered according to the IUCN red list of threatened species 2021.

Most of the observed species were resident breeders except the African Openbill *Anastomus lamelligerus*, Broad-billed Roller *Eurystomus glaucurus* and the Grey Crowned-Crane *Balearica regulorum* are resident breeders and an intra-African migrants but nonbreeding, the Eastern Olivaceous Warbler *Hippolais pallida* a winter visitor, the Greater Blue-eared Glossy-Starling *Lamprotornis chalybaeus* a resident but breeding not proven but likely, the Grey Crowned-Crane *Balearica regulorum* a resident breeder and an intra-African migrant but nonbreeding, Isabelline Shrike *Lanius isabellinus* a regular winter visitor and a passage migrant, White-throated Bee-eater *Merops albicollis* an intra-African migrant but non-breeding, a former breeder as well as a regular passage migrant, the Willow Warbler *Phylloscopus trochilus* a

winter visitor and a regular passage migrant and the Woodland Kingfisher *Halcyon senegalensis* a regular passage migrant and resident breeder.

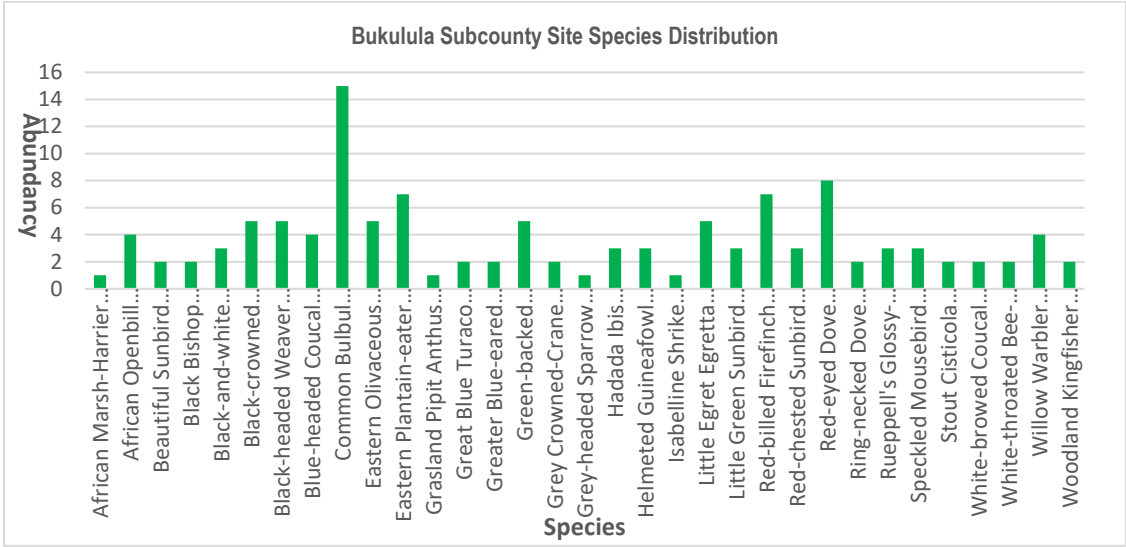


Figure 6-15: Number of species per taxa recorded at Bukulula Subcounty site



Figure 6-16: Photos of bird species taken during the survey

Table 6—17 List of all Avifauna species observed and recorded in the survey sites

No.	Species	Breeding & Migratory Trend	Habitat Specialization	IUCN Status	Atlas Number	Regional Status
1	African Jacana <i>Actophilornis africanus</i>	RB	W	LC	225	LC
2	African Mourning Dove <i>Streptopelia decipiens</i>	RB	NF	LC	347	LC
3	African Openbill <i>Anastomus lamelligerus</i>	RB,AfM/NB	w	LC	43	LC
4	African Pied Wagtail <i>Motacilla aguimp</i>	RB	NF/w	LC	991	LC
5	African Pygmy-Kingfisher <i>Ispidina picta</i>	RB, AfM/NB	f/w	LC	478	LC
6	African Yellow White-eye <i>Zosterops senegalensis</i>	RB	NF	LC	1133	LC
7	Ashy Flycatcher <i>Muscicapa caerulea</i>	RB	F	LC	938	LC
8	Beautiful Sunbird <i>Cinnyris pulchellus</i>	RB	F	LC	1116	LC
9	Black Bishop <i>Euplectes gierowii</i>	RB	NF	LC	1144	LC
10	Black Kite <i>Milvus migrans</i>	RB,PM	NF	LC	138	LC
11	Black-and-white Mannikin <i>Spermestes bicolor</i>	RB	f	LC	1265	LC
12	Black-and-white-casqued Hornbill <i>Ceratogymna subcylindricus</i>	RB	F	LC	513	LC
13	Black-crowned Waxbill <i>Estrilda nonnula</i>	RB	NF	LC	1230	LC
14	Black-headed Heron <i>Ardea melanocephala</i>	RB	NF	LC	27	LC
15	Black-headed Paradise-Flycatcher <i>Terpsiphone rufiventer</i>	RB	F	LC	967	LC
16	Black-headed Weaver <i>Ploceus melanocephalus</i>	RB	NF	LC	1165	LC
17	Blue-headed Coucal <i>Centropus monachus</i>	RB	w	LC	404	LC
18	Blue-spotted wood dove <i>Turtur afer</i>	RB	NF	LC	355	LC
19	Bocage's Bush- Shrike <i>Malaconotus bocagei</i>	RB	w	LC	1013	LC
20	Broad-billed Roller <i>Eurystomus glaucurus</i>	RB,AfM/NB	NF/F/f	LC	500	LC
21	Bronze Mannikin <i>Spermestes cucullatus</i>	RB	NF	LC	1266	LC
22	Brown Snake-Eagle <i>Circaetus cinereus</i>	B(B), AfM/NB	F	LC	98	R-NT

No.	Species	Breeding & Migratory Trend	Habitat Specialization	IUCN Status	Atlas Number	Regional Status
23	Brown-throated Wattle-eye <i>Platysteira cyanea</i>	RB	NF	LC	960	LC
24	Buff-throated Apalis <i>Apalis rufogularis</i>	RB	F	LC	826	LC
25	Cardinal Woodpecker <i>Dendropicos fuscescens</i>	RB	NF	LC	585	LC
26	Cattle Egret <i>Bubulcus ibis</i>	RB	NF	LC	32	LC
27	Cinnamon-chested Bee-eater <i>Merops oreobates</i>	RB	F	LC	488	R-RR
28	Common Bulbul <i>Pycnonotus barbatus</i>	RB	f	LC	732	LC
29	Common Quail <i>Coturnix coturnix</i>	WV, AfM/B	NF	LC	165	LC
30	Common Sandpiper <i>Actitis hypoleucos</i>	WV, PM, FB	w	LC	252	LC
31	Compact Weaver <i>Pachyphantes superciliosus</i>	RB	NF/w	LC	1184	LC
32	Crowned Hornbill <i>Tockus alboterminatus</i>	RB	f	LC	515	LC
33	Diderick Cuckoo <i>Chrysococcyx caprius</i>	RB, AfM/(B)	f	LC	388	LC
34	Double-toothed Barbet <i>Lybius bidentatus</i>	RB	f	LC	534	LC
35	Eastern Olivaceous Warbler <i>Hippolais pallida</i>	WV	NF	LC	888	LC
36	Eastern Plantain-eater <i>Crinifer zonurus</i>	RB	NF	LC	376	LC
37	Fawn-breasted Waxbill <i>Estrilda paludicola</i>	RB	NF	LC	1231	LC
38	Fork-tailed Drongo <i>Dicrurus adsimilis</i>	RB	f	LC	644	LC
39	Grassland Pipit <i>Anthus cinnamomeus</i>	RB	NF	LC	981	LC
40	Great Blue Turaco <i>Corythaeola cristata</i>	RB	F	LC	372	LC
41	Greater Blue-eared Glossy-Starling <i>Lamprotornis chalybaeus</i>	R(B)	f	LC	1055	LC
42	Green Hylia <i>Hylia prasina</i>	RB	F	LC	889	LC
43	Green-backed Camaroptera <i>Camaroptera brachyura</i>	RB	f	LC	837	LC
44	Green-throated Sunbird <i>Chalcomitra rubescens</i>	RB	F	LC	1120	LC
45	Grey Heron <i>Ardea cinerea</i>	RB, FB, OW	NF/w	LC	25	R-NT
46	Grey Kestrel <i>Falco ardosiaceus</i>	RB	NF	LC	147	LC
47	Grey-backed Fiscal <i>Lanius excubitoroides</i>	RB	NF	LC	1032	LC
48	Grey-headed Sparrow <i>Passer griseus</i>	RB	NF	LC	1207	LC
49	Hadada Ibis <i>Bostrychia hagedash</i>	RB	NF	LC	51	LC

No.	Species	Breeding & Migratory Trend	Habitat Specialization	IUCN Status	Atlas Number	Regional Status
50	Hamerkop <i>Scopus umbretta</i>	RB	NF	LC	42	LC
51	Helmeted Guineafowl <i>Numida meleagris</i>	RB	NF	LC	190	LC
52	Intermediate Egret <i>Egretta intermedia</i>	RB	w	LC	38	LC
53	Isabelline Shrike <i>Lanius isabellinus</i>	WV, PM	NF	LC	1034	LC
54	Laughing Dove <i>Streptopelia senegalensis</i>	RB	NF	LC	351	LC
55	Little Egret <i>Egretta garzetta</i>	RB	w	LC	36	LC
56	Little Green Sunbird <i>Anthreptes seimundi</i>	RB	NF	LC	1121	LC
57	Little Greenbul <i>Andropadus virens</i>	RB	NF	LC	705	LC
58	Little Swift <i>Apus affinis</i>	RB	NF	LC	443	LC
59	Little Weaver <i>Ploceus luteolus</i>	RB	NF	LC	1172	LC
60	Lizard Buzzard <i>Kaupifalco monogrammicus</i>	RB	NF	LC	129	LC
61	Long-tailed Cormorant <i>Phalacrocorax africanus</i>	RB	W	LC	17	LC
62	Malachite Kingfisher <i>Alcedo cristata</i>	RB	w	LC	466	LC
63	Marabou Stork <i>Leptoptilos crumeniferus</i>	RB, AfM/B	NF	LC	49	LC
64	Mariqua Sunbird <i>Cinnyris mariquensis</i>	RB	f	LC	1107	LC
65	Northern Black-Flycatcher <i>Melaenornis edolioides</i>	RB	NF	LC	934	LC
66	Pied Crow <i>Corvus albus</i>	RB	NF	LC	654	LC
67	Pied Kingfisher <i>Ceryle rudis</i>	RB	W	LC	465	LC
68	Red bellied Paradise-Flycatcher <i>Terpsiphone rufiventer</i>	RB	F	LC	967	LC
69	Red billed Firefinch <i>Lagonosticta senegala</i>	RB	NF	LC	1241	LC
70	Red-chested Cuckoo <i>Cuculus solitarius</i>	RB, AfM/NB	F	LC	399	LC
71	Red-chested Sunbird <i>Cinnyris erythrocerca</i>	RB	NF/w	LC	1098	LC
72	Red-eyed Dove <i>Streptopelia semitorquata</i>	RB	F	LC	350	LC
73	Ring-necked Dove <i>Streptopelia capicola</i>	RB	F	LC	346	LC
74	Rueppell's Glossy-Starling <i>Lamprotornis purpuropterus</i>	RB	NF	LC	1060	LC
75	Sooty Chat <i>Myrmecocichla nigra</i>	RB	NF	LC	771	LC
76	Speckled Mousebird <i>Colius striatus</i>	RB	NF	LC	459	LC

No.	Species	Breeding & Migratory Trend	Habitat Specialization	IUCN Status	Atlas Number	Regional Status
77	Speckled Pigeon <i>Columba guinea</i>	RB	NF	LC	341	LC
78	Spectacled Weaver <i>Ploceus ocularis</i>	RB	NF	LC	1177	LC
79	Tambourine Dove <i>Turtur tympanistria</i>	RB	NF	LC	357	LC
80	Trilling Cisticola <i>Cisticola woosnami</i>	RB	NF	LC	873	LC
81	Variable Sunbird <i>Cinnyris venustus</i>	RB	NF	LC	1128	LC
82	White-browed Coucal <i>Centropus superciliosus</i>	RB	NF	LC	406	LC
83	White-headed Sawwing <i>Psolidoprocne albiceps</i>	RB,Af/NB	NF	LC	639	LC
84	White-rumped Swift <i>Apus caffer</i>	RB	NF	LC	447	LC
85	White-throated Bee-eater <i>Merops albicollis</i>	AfM/NB,FB,PM	NF	LC	479	LC
86	White-throated Greenbul <i>Phyllastrephus albigularis</i>	RB	F	LC	718	LC
87	Willow Warbler <i>Phylloscopus trochilus</i>	WV,PM	NF	LC	908	LC
88	Wire-tailed Swallow <i>Hirundo smithii</i>	RB	NF	LC	637	LC
89	Woodland Kingfisher <i>Halcyon senegalensis</i>	PM,RB	NF	LC	475	LC
90	Yellow-rumped Tinkerbird <i>Pogoniulus bilineatus</i>	RB	F	LC	548	LC
91	Yellow-throated Tinkerbird <i>Pogoniulus subsulphureus</i>	RB	F	LC	555	LC
92	Yellow-whiskered Greenbul <i>Andropadus latirostris</i>	RB	F	LC	701	LC

Birds were categorised using IUCN and *The Bird Atlas* criteria as outlined in Table 6-18 below.

Table 6—18 Categories of birds according to their IUCN status and habitat requirements

Category	Description	Abbreviation
Forest	<ul style="list-style-type: none"> Forest specialists Cannot survive outside the primary forest 	FF
	<ul style="list-style-type: none"> Forest generalists. They can live in the forest and at the forest edge or a degraded forest 	F
	<ul style="list-style-type: none"> Don't live in the forest 	f

Category	Description	Abbreviation
	<ul style="list-style-type: none"> They come to the forest as 'visitors' 	
Water	<ul style="list-style-type: none"> Species restricted to wetlands/open waters They cannot survive outside an aquatic environment 	W
	<ul style="list-style-type: none"> Non-specialist water birds often found near water Facultative water birds 	w
Grassland & Agricultural Cultivation	<ul style="list-style-type: none"> They live in grassland habitats They are generally widely spread in all habitats but tend to avoid forests They are species that can be found in cultivated areas like gardens, fallow lands and settlements 	NF
Least Concern	<ul style="list-style-type: none"> Bird species that are listed to be of least concern according to the IUCN red list of threatened species 	LC
Vulnerable	<ul style="list-style-type: none"> Bird species whose populations are listed to be of vulnerability according to the IUCN red list of threatened species 	VU
Near threatened	<ul style="list-style-type: none"> Bird species that are listed to be nearly threatened numbers according to the IUCN red list of threatened species 	NT
Endangered	<ul style="list-style-type: none"> Bird species that are listed to be endangered in numbers according to the IUCN red list of threatened species 	EN
Globally critical	<ul style="list-style-type: none"> Bird species whose populations are listed to be globally critical according to the IUCN red list of threatened species 	G-CR
Regionally critical	<ul style="list-style-type: none"> Bird species whose populations are listed to be regionally critical according to the IUCN red list of threatened species 	R-CR
Globally vulnerable	<ul style="list-style-type: none"> Bird species whose populations are listed to be globally vulnerable according to the IUCN red list of threatened species 	G-VU
Regionally vulnerable	<ul style="list-style-type: none"> Bird species whose populations are listed to be regionally vulnerable according to the IUCN red list of threatened species 	R-VU
Globally lower-risk, near threatened	<ul style="list-style-type: none"> Bird species that are listed to be globally lower-risk, near threatened according to the The Bird Atlas of Uganda 	G-LR/nt
Regionally Near threatened	<ul style="list-style-type: none"> Bird species that are listed to be regionally near threatened according to the The Bird Atlas of Uganda 	R-NT
Globally Endangered	<ul style="list-style-type: none"> Bird species that are listed to be globally endangered in numbers according to the The Bird Atlas of Uganda 	G-EN
Regionally Endangered	<ul style="list-style-type: none"> Bird species that are listed to be regionally endangered in numbers according to the The Bird Atlas of Uganda 	R-EN

Category	Description	Abbreviation
Globally range-restricted	<ul style="list-style-type: none"> ▪ Bird species that are listed to be globally range-restricted according to the The Bird Atlas of Uganda 	G-RR
Species of regional responsibility	<ul style="list-style-type: none"> ▪ Bird species that are listed to be of regional responsibility according to the The Bird Atlas of Uganda 	R-RR
Breeding	<ul style="list-style-type: none"> ▪ Occasional Breeder 	OB
	<ul style="list-style-type: none"> ▪ Resident Breeder (Species that are residents and breed from within their permanent locality) 	RB
	<ul style="list-style-type: none"> ▪ Resident, Breeding not proved but likely 	R(B)
	<ul style="list-style-type: none"> ▪ Former Breeder 	FB
Migrant Species	<ul style="list-style-type: none"> ▪ Migrant Breeder 	MB
	<ul style="list-style-type: none"> ▪ Migrant, Breeding not proved (but likely) 	M(B)
	<ul style="list-style-type: none"> ▪ Intra-African Migrant, breeding 	AfM/B
	<ul style="list-style-type: none"> ▪ Intra-African migrant, breeding not proved (but likely) 	AfM/(B)
	<ul style="list-style-type: none"> ▪ Intra-African Migrant, not breeding 	AfM/NB
	<ul style="list-style-type: none"> ▪ Regular Passage Migrant 	PM
	<ul style="list-style-type: none"> ▪ Regular Winter Visitor 	WV
	<ul style="list-style-type: none"> ▪ Resident non-breeder 	RN
	<ul style="list-style-type: none"> ▪ Occasional Winter Visitor 	OW
	<ul style="list-style-type: none"> ▪ Accidental Visitor or vagrant 	AV
Introduced species	<ul style="list-style-type: none"> ▪ These are species that are not indigenous to Africa (Uganda) but were just introduced 	I
Not Evaluated	<ul style="list-style-type: none"> ▪ Bird species whose population status has not yet been evaluated. 	NE

6.3.2.3 Mammals

From the surveys conducted, 9 species (Table 6-19) were recorded. All species except Stripped Ground Squirrel *Xerus erythropus* and Cane rat *Thryonomys gregorianus* were recorded from interviews with people from the local community. The exceptions listed here were recorded either from direct observation of their presence their and foot prints.

Table 6—19: Species of mammals recorded in Kalungu District

	Order	Mammals
1	Artiodactyla	Hippopotamus <i>Hippopotamus amphibious</i>
2		Sitatunga Tragelaphus <i>spekei</i>
3		Water bucks <i>Kobus ellipsiprymnus</i>
4		Common Bush Duiker <i>Sylvicapra grimmia</i>
5		Marsh Mongoose <i>Atilax paludinosus</i>
6		Spot necked Otter <i>Lutra maculicollis</i>
7	Primates	Vervet Monkey <i>Cercopithecus aethiops</i>
8	Rodentia	Cane rat <i>Thryonomys gregorianus</i>
9		Stripped ground Squirrel <i>Xerus erythropus</i>

The mammal critical habitat is mainly lake shore wetlands. Most of the wetland have been converted into agricultural land for food crops and Eucalyptus plantations. Hippopotamus *Hippopotamus amphibious* has been reported to be a problem animal in the gardens. Because of impacts on the wetlands, two species in particular the Sitatunga *Tragelaphus spekei* and the Spot necked Otter *Lutra maculicollis* are likely to be directly affected. The former by habitat loss and hunting pressure while the latter by increased siltation into the water bodies from surrounding agriculture.

6.3.2.4 Species of Conservation Concern

Of all the species recorded, one species is globally and nationally threatened according to the IUCN 2021) and WCS 2016 (Table 6-19) i.e., *Hippopotamus amphibious*, it is listed as Vulnerable (VU). The rest of the other species recorded are not threatened in any way according to IUCN 2021 red listing basing on their wide distribution, stable populations and not facing any alarming threats. IUCN 2021 however notes that populations of some species are decreasing due to hunting, increased human wildlife conflicts and habitat loss for example *Tragelaphus spekei*.

6.3.2.5 Aquatic biota

Phytoplankton

Phytoplanktons are the micro aquatic plants. They are the primary producers in water bodies. The composition of our results was dominated by the green algae both in species composition (8) and individual counts per given volume. They were followed by the blue green algae which recorded seven (7) species. The least were flagellates and diatom (two and one species respectively). Since the green algae are good food for fish, there abundance during the survey may signify that the sampled ecosystems are still in sound state and probably can sustain fish production (Table 6-20).

Table 6—20: Species composition and relative abundance (%) of phytoplankton (No. of organisms per milliliter)

Taxon	Katinda R	Bulingo landing site	Churwe R./ Namwanzi
Blue- Green	N= 392	N= 310	N= 106
<i>Microcystis sp</i>	31.12	27.10	33.96
<i>Anabeana sp</i>	18.37	21.61	22.64
<i>Desmidium sp</i>	17.35	13.55	0.00
<i>Tolypothrix sp</i>	14.29	11.94	18.87
<i>Oscillatoria sp</i>	13.27	9.68	13.21
<i>Calothrix sp</i>	-	7.10	0.00
<i>Lyngbya sp</i>	5.61	9.03	11.32
Green	N= 345	N= 492	N= 208
<i>Spirogyra sp</i>	26.67	28.05	29.81
<i>Urothrix sp</i>	18.55	14.63	16.83
<i>Westella sp</i>	12.17	13.01	9.62
<i>Chlorella sp</i>	10.43	9.35	7.69
<i>Hildenbradia sp</i>	13.91	0.00	0.00
<i>Cladophora sp</i>	5.51	16.26	6.73
<i>Oedogonium sp</i>	6.96	11.79	12.02
<i>Zygnema sp</i>	5.80	6.91	17.31
FLAGELLtes	N= 12	N= 45	N= 48
<i>Uroglena sp</i>	-	53.33	62.50
<i>Phacus sp</i>	100.00	46.67	37.50

Zooplankton

Zooplanktons are the micro secondary producers in water. They are an important element of the aquatic food chain serving as an intermediary by transferring energy from planktonic algae (primary producers) to the larger invertebrate predators and fish which in turn feed on them. Results of this survey recorded a dominance of rotifers with a total number of seven species (7) while nematodes and crustaceans recorded only one (1) species each. Rotifers are known to provide a vital food source especially for the young fish (larvae and fry) stages thus their composition and abundance are vital for fish growth and survival at that fragile stage (Table 6-21). Thus, their dominance in the sampled sites signify that the water bodies may still sustain the nursery fish stages thus, proper fish productivity.

Table 6—21: Species composition and relative abundance (%) of Zooplankton (No. of organisms per litre)

	Katinda R.	Bulingo landing site	Churwe R/ Namwanzi
TAXON			
ROTIFERS	N= 219	N= 353	N= 317
<i>Proales sp</i>	21.00	20.40	23.97
<i>Euclanis sp</i>	17.35	18.13	15.14

<i>Keratella sp</i>	9.13	14.73	10.09
<i>Brachionus sp</i>	2.74	10.76	12.62
<i>Trichocerca sp</i>	10.50	12.46	13.88
<i>Lecane sp</i>	20.09	15.58	11.04
<i>Ascomopha sp</i>	19.18	7.93	13.25
Nematodes	N= 24	N= 23	N= 34
<i>Diplogosteroide sp</i>	100	100	100
Crustaceans	N= 4	N= 20	N= 48
<i>Cyclops sp</i>		100.00	54.17
<i>Bosmina sp</i>	100	0.00	45.83

Macro-invertebrates (benthic) fauna

The benthic macro-invertebrates are located at the bottom of aquatic ecosystems and play various roles such as mineralization, mixing of sediments, the flux of oxygen into sediment and cycling of organic matter (George et al., 2009). Macro-invertebrates are also important food sources for animals higher on the food chain. Frequent disturbance of the benthic community may keep them in early stages of development, thereby affecting the composition and function of this community and impacting fish that depend on a healthy benthic community. When they die, they decay thereby, releasing nutrients that are reused by aquatic plants and animals in the food chain (Stockley et al., 1998). However, their presence is threatened by changes in their habitat associated with pollution, erosion, and siltation (Jenyo-Oni & Oladele, 2016; Lydeard et al., 2004) and can therefore, be used to calculate a water quality index (Adakole & Anunne, 2003). In the current study seven (7) different types of benthic organisms were recorded (Table 6-16). Bulingo landing site recorded the highest (6) number of organisms followed by Churwe landing site (5) while R. Katinda recorded only two (Table 6-22).

Table 6—22: The species composition and relative abundance (%) of macro-invertebrates (Benthic fauna)

Macro-invertebrate	Family	Bulingo landing site	Churwe R/ Namwanzi	Katinda R.
Black water beetles	Hydrophilus	-	7	-
Chironomid larvae	Chironomidae	12	-	-
Chaoborus larvae	Chaoboridae	7	-	-
Mosquito larvae	Culicidae	6	12	4
Odonata larvae	Libellulidae	1	3	8
Earth Worms	Lumbricidae	5	1	-
Water snails	gastropoda	1	2	-

Fish data

A total of 4 fish species belonging to 3 families were recorded in the sampled aquatic ecosystems (Table 6-23 and Figure 6-19). Bulingo landing site recorded the highest (3) number of species while Churwe R. and Katinda R. recorded only one each. All the fish species recorded in the project area were not of serious ecological concern according to the IUCN red list 2021-3. Implying that as regards fish biota in the area, there is no such fear that the project activities will cause critical damage to the species if handled carefully.

Table 6—23: The species composition of fish in the project area

Fish Family	Species	Bulingo landing site	Churwe R/ Namwanzi	Katinda R.	IUCN Red list 2021-3
Lepidosireni dae	<i>Protopterus aethiopicus</i>	P	-	-	Least Concern
Clariidae	<i>Clarias casonii</i>	-	P	P	Not yet assessed
	<i>Clarias gariepinus</i>	P	-	-	Least Concern
Cichlidae	<i>Oreochromis leucostictus</i>	P	-	-	Least Concern
3	4	3	1	1	



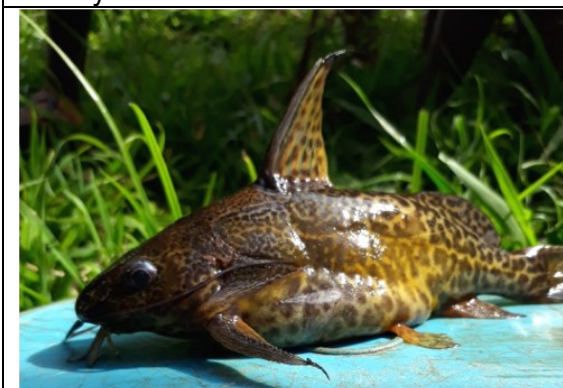
Mastercembelus frenatus



Clarias casonii



Mormyrus niloticus



Synodontis afrofisheri



Oreochromis niloticus



Lates niloticus

Protopterus aethiopicus

Figure 6-17: Fish species recorded within the project area

6.3.2.6 Herpetofauna

Amphibians

By the time of conducting the detail survey, the weather was generally dry. In dry weather, it takes time to find amphibians especially outside wetlands. During the survey, nine amphibian species were recorded in the project area (Table 6-25)). One species is a toad and eight are categorized as frogs. A total of 31 amphibian species are known to occur in the project area. Twenty-two species of amphibians recorded by previous researchers were not encountered in the project sites that were visited. The species that were encountered during the inventory represent 5 families and 7 genera. Family Hyperoliidae (Tree Frogs) was the most represented with four species recorded during the survey.

The field visit to the project sites was conducted at the end of the wet season and amphibians normally go under hiding to avoid desiccation caused by hot weather. With more sampling more species could be recorded. Amphibians are also secretive creatures and they require ample time to compile a complete species list of the project area.

Four habitats were surveyed including wetlands areas, forest / woodland areas, Garden areas and existing palm oil Garden areas. The wetland habitat areas registered all the nine amphibian species, the forest / woodland areas registered only one species, the garden areas registered none, while the existing palm oil garden areas also registered no amphibians. The species registered in the forest/woodland areas was the Eastern Groove-crowned Bullfrog *Hoplobatrachus occipitalis*. The species was encountered near a wet area within the forest / woodland areas. The Eastern Groove-crowned Bullfrog *Hoplobatrachus occipitalis* tend to migrate during the dry season to the edges of water sources. In the wet season, the Eastern Groove-crowned Bullfrog *Hoplobatrachus occipitalis* is usually wide spread including to any ponds (Spieler 1997).

No species of conservation significance was registered during the survey. All the nine species encountered are categorized as least concern by the 2020 IUCN Red List of threatened species. The species are still widespread and common over much of their range (Rödel. 2000). The

Mascarene Rocket Frog *Ptychadena mascareniensis* is categorized as data deficient (DD) by the National Red List for Uganda (WCS 2016).

Table 6—24 Amphibian species recorded in the project area

Family	Species Scientific and Common Names	Red List Status	Wetlands	Forest/ Woodland Area	Garden Areas	Existing Palm Oil Garden Areas
Bufonidae	<i>Scherophrys steindachneri</i> Steindachner's Toad	Least Concern	1	-	-	-
Dicroglossidae	<i>Hoplobatrachus occipitalis</i> Eastern Groove-crowned Bullfrog	Least Concern	2	8	-	-
Hyperoliidae	<i>Afrixalus quadrivittatus</i> Striped Leaf-folding Frog	Least Concern	1	-	-	-
Hyperoliidae	<i>Hyperolius kivuensis</i> Kivu Reed Frog	Least Concern	1	-	-	-
Hyperoliidae	<i>Hyperolius viridiflavus</i> Common Reed Frog	Least Concern	1	-	-	-
Hyperoliidae	<i>Leptopelis bocage</i>	Least Concern	1	-	-	-
Phrynobatrachidae	<i>Phrynobatrachus mababiensis</i> Dwarf Puddle Frog	Least Concern	4	-	-	-
Phrynobatrachidae	<i>Phrynobatrachus natalensis</i> Natal Puddle Frog	Least Concern	1	-	-	-
Ptychadenidae	<i>Ptychadena mascareniensis</i> Mascarene Rocket Frog	Least Concern (Data Deficient)	2	-	-	-
	Total No. of species		9 species	1 species	No species	No species

Reptiles

Eight reptile species were recorded in the project area (Table 6-26). Two were lizards, four were snakes, one was a gecko and one was skink. All the eight species were reported by the residents in the project area. None was encountered during the survey.

A number of scientists have done herpetological surveys in the project area. Previous surveys indicate that a total of 29 reptile species are known to occur in the project area and its surroundings.

Five species were reported to occur in the Wetland areas, Five in the Forest / Woodland areas, three in gardens / cultivated area and three in the existing palm oil garden areas. Green snakes were also reported as occurring in the palm oil garden areas but the description provided by the residents was not enough to conclusively arrive at the species identity.

No species of conservation significance was recorded during the survey. All species registered are categorized as Least Concern by the 2020 IUCN Red List of threatened species. However, the Central Africa Rock Python *Python sebae* and the Nile Monitor *Varanus niloticus* are listed under the Endangered Species Decree of 1985. International trade of the species is prohibited.

The Species are listed under CITES Appendix II (Branch 1998). However, in Uganda the species were down listed from Appendix II because they are still abundant and wide spread in the Country.

Table 6—25 Checklist of Reptile species encountered during the survey

Family	Species Scientific and Common Names	Red List Status	Wetlands	Forest / woodland Area	Garden Areas	Existing Palm Oil Garden Areas
Agamidae	<i>Acanthocercus atricolis</i> Blue Headed Agama	Least Concern			Reported	Reported
Elapidae	<i>Naja melanoleuca</i> Forest Cobra	Least Concern	Reported	Reported	Reported	Reported
Gekkonidae	<i>Hemidactylus mabouia</i> Tropical House Gecko	Least Concern	Reported			
Natricidae	<i>Natriciteres olivacea</i> Olive Marsh Snake	Least Concern	Reported			
Pythonidae	<i>Python sebae</i> Central Africa Rock Python	Least Concern	Reported	Reported		
Scincidae	<i>Trachylepis maculilabris</i> Speckled-lipped Skink	Least Concern		Reported	Reported	Reported
Varanidae	<i>Varanus niloticus</i> Nile Monitor	Least Concern	Reported	Reported		
Viperidae	<i>Bitis arietans</i> Puff Adder	Least Concern		Reported		
	Total No. of Species		5 species	5 species	3 species	3 species

6.3.2.7 Insects

A total of 54 species of butterflies and 9 species of dragonflies were recorded from the different surveyed areas in Bukulula and Lukaya Town Council. The distribution of butterfly and dragonfly species varied between the different sites surveyed. A number of habitat specific butterfly species were present for example 2 forests edge/woodland species, 13 migrant species, 13 open habitat species, 25 widespread species.

Key Observations

- No IUCN threatened or endangered species were recorded within the proposed project area. Most of the species are common open country, migrant species or widespread species. However, some sensitive butterfly species could be disturbed especially those that are habitat specific. None of the swamp/wetland species that have limited continental distribution have been recorded by this study.
- Watercourses such as rivers, streams, wetlands and other types of flowing water are some of the suitable habitats for Odonates (dragonflies and damselflies). Changes in aquatic plant communities, such as plant removal or draining wetlands may reduce the quality of odonate habitat.

7. STAKEHOLDER ENGAGEMENT

This Chapter presents the objectives, process and the outcomes of the stakeholder involvement during this ESIA. Emphasis has been placed on a fully-inclusive, open and transparent public participation process and the transfer of information regarding the proposed project. The ESIA started with a scoping exercise aimed at identifying relevant issues to form focus of the ESIA and refine the terms of reference provided by the project proponent. It is a continuous process throughout all the project phases including construction and post-construction. This chapter describes the process of public consultation, presenting views from the different stakeholders engaged during ESIA. Feedback from these consultations has guided the team in impact identification and mitigation measures proposing and in overall report preparation.

7.1 Stakeholder disclosure and engagement requirements

Regulation 16 of the National Environment (Environmental and Social Assessment) Regulations, 2020 requires the developer to carry out stakeholder consultation during the environmental and social impact study. The World Bank's Environmental and Social Standards 10 (ESS 10) also emphasizes consultation and disclosure of the project's environmental impact assessment. As required under regulation 13 of the National Environment (Environmental and Social Assessment) Regulations, 2020, stakeholder engagement commenced during the scoping phase of the ESIA and continued into the Environmental and Social Impact Study.

7.2 Objectives of stakeholder engagement

The broad objective of the stakeholder engagement process was to provide the authorities, interested parties and the communities likely to be affected by the project an opportunity to air out their views, concerns, and opportunities as regards the proposed project and to consequently address their concerns.

The specific objectives of stakeholder engagement included the following:

- To provide information about the project and to capture stakeholder knowledge on key environmental and social baseline information in the project areas;
- To provide opportunities to stakeholders to discuss their views, opinions, suggestions and concerns;
- To manage expectations and misconceptions regarding the project;
- To inform the process of developing appropriate mitigation and management measures as well as institutional arrangements for effective project implementation and;
- To create an enabling environment through which the project will smoothly operate.

7.3 Stakeholder identification and composition

In order to develop an effective consultation, programme it was necessary to determine exactly who the stakeholders were, basing on the definition that a stakeholder is "any individual or group who is potentially affected by a project or can themselves affect a project". A list of stakeholders that were consulted during the ESIA process is presented in Table 7-1 below;

Table 7—1 List of Stakeholders Consulted

Institution	Information requirement	Engagement mechanism	Date of engagement
Ministry of Agriculture Animal Industry and Fisheries	Provision of relevant documentation and information to guide in impact analysis and mitigation measures recommendation	Formal meeting (see comments in Appendix 2.	8/2/2022
Ministry of Works and Transport	Interest in plantation roads to be created Likely issues of concern	Formal meeting (See comments Appendix 2)	11/2/2022
Ministry of Gender, Labour and Social Development ▪ Department of Occupational Health and Safety ▪ Department of Community Development	Workplace registration, labour and OSH laws, addressing social, employment and cultural issues	Formal meeting (See minutes in Appendix 2)	14/2/2022
NEMA	Anticipated impacts and expectations from the proposed project Propose mitigation measures	Formal meeting (See comments in Appendix 2)	18/2/2022
Bajja /Bugweri Village meeting	Social-Economic baseline. Anticipated impacts and expectations from the proposed project Propose mitigation measures	Community meeting Group discussion Appendix 2.	14/07/2022
Kalangala Village meeting	Social-Economic baseline. Anticipated impacts and expectations from the proposed project Propose mitigation measures	Community meeting Group discussion Appendix 2.	9/07/2022
Kitoot A Lwabenge	Social-Economic baseline. Anticipated impacts and expectations from the proposed project Propose mitigation measures	Community meeting Group discussion Appendix 2	9/07/2022

7.3.1 Issues/comments raised by stakeholders

A summary of the issues and concerns raised by stakeholders during the ESIA is presented in Table 7-2. Figure 7-1 below shows photographs of consultative meeting with the smallholders within Kagulu District

Table 7—2: Issues/concerns raised by project stakeholders

Stakeholder	Issues raised	Action points for implementation/Response
Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) NOPP	<ul style="list-style-type: none"> Before introduction of oil palm, 96% of oil palm was imported yet this could be produced locally. MAAIF noted that government is making effort to expand oil palm growing to other areas such as Mukono, Masaka, Buikwe and Mayuge so as to meet current national demands. Trials are being conducted in other areas other than those listed above. 	
	<ul style="list-style-type: none"> Oil palm is economically interesting because harvest extends to between 20-25 years at an interval of 10 days which grantees regular cash flows for participating households. Currently, about 2000 out growers from Kalangala are receiving 5bn monthly. This has led to mounting pressure from other areas to get on board. 	This positive impact of this project has been documented in section 8.4 of this report.
	<ul style="list-style-type: none"> The target is to produce 100,000 tonnes although currently production is at 15,000 with hope of raising to 20,000 once harvests start in Buvuma. NOPP noted that the crop had negative publicity but through continuous sensitisation, it is gradually being embraced. 	Extensive and continuous community sensitisation and awareness meetings have been recommended in order for the wider community to tap into the benefits of this project.
	<ul style="list-style-type: none"> In regard to policy, legal and institutional framework guiding the project, the following list was shared by NOPP. National Development Plan 3, National Environment Management Authority, National Forestry Authority, Ministry of Justice and Constitutional Affairs, Ministry of Agriculture Animal Industry and Fisheries, Agriculture, Sector Strategic Plan Under NDP3, Ministry of Trade, Industry and Cooperatives, Ministry of Finance and Economic Planning, Ministry of Lands, Program for agro-industrialisation within the NDP3, Public Finance Management and National Agricultural Chemicals Control Board. 	These have been reviewed and compliance measures documented in Chapter 3 of this report.

	<ul style="list-style-type: none"> The relevant policies emphasized were National Agriculture Policy, National Fertilizer Policy, Agriculture and Irrigation Policy, Draft Mechanisation Policy, National Agricultural Research System Policy. Agricultural Chemical Control Act, Energy Policy, Land Policy, National HIV Policy, National Health Policy, Occupation Health and Safety Policy, Historical Monuments Act Cap 46. 	These have been reviewed and compliance measures documented in Chapter 3 of this report.
	<ul style="list-style-type: none"> Impacts such as greenhouse gas emissions from the processing plant and vegetation clearance are likely to occur and the controls are; <ul style="list-style-type: none"> <i>i. Supporting and encouraging deliberate re-forestation in farming communities,</i> <i>ii. Growing of legumes as cover crops within the oil palm gardens,</i> <i>iii. Conservation tilling (circling) ploughing only around the crop,</i> <i>iv. Following the do not harm principle to the dot and slash and burn is totally discouraged.</i> 	The impacts and the recommended have been documented
	<ul style="list-style-type: none"> Because there is heavy reliance on fertilizers during the oil palm crop production cycle, <i>observation of the 200m buffer zone by farmers is emphasised and enforced to limit contamination.</i> Enrichment of the buffer area through greening, spot application of fertiliser and adherence to required amounts to minimise surplus that could be washed away into neighbouring environs. 	The mitigation measures associated with use of fertilizers are provided in Chapter 8 and 9.
	<ul style="list-style-type: none"> Farmers should be organised in groups with extension workers who oversee farming activities to ensure adherence to set standards. 	This recommendation has been documented in Chapter 9.
	<ul style="list-style-type: none"> Food security- The minimum threshold land holding for households that intend to participate in oil palm growing is 2 hectares and at least an acre above the 2hectares for food crop growing. 	Engaging in food cropping along side oil palm growing has been emphasized to ensure food security. This recommendation is provided under chapter 9.
	<ul style="list-style-type: none"> Waste management: They indicated that organic waste is buried to decompose, or taken back to the garden as manure, while licensed waste handles collect and dispose of hazardous waste. 	This recommendation has been documented in Chapter 9.
	<ul style="list-style-type: none"> The KOPGT has contributed to education in Kalangala through construction of a school. The project has a component of alternative livelihood through which a wider community will benefit. 	A recommendation for the project developer (s) to undertake Corporate Social Responsibility has been suggested in Chapter 8 and 9 of this ESIS.

	<ul style="list-style-type: none"> Planting of oil palm crop on slopes higher than 25° is discouraged because these present higher chances of erosion. Other land management techniques such as terracing are encouraged. 	Erosion control measures have been proposed in Chapter 8 and 9 of this report.
	<ul style="list-style-type: none"> Being a government project, government will offer support in areas found to be lacking, such as support to improve social service delivery. 	Government noted the gaps in social service delivery, and thus, the development of the NOPP to increase production of OP through engagement of out growers, a business that will significantly boost income of farmers in Masaka Hub/Kalungu District, and thus improve their standard of living.
	<ul style="list-style-type: none"> Clear labour and employment policies will be set and followed to the dot. No child will be employed in oil palm production related activities. Sensitisation should be continuous to emphasize this. 	The NOPP have clear recruitment procedures so as to avoid child labour. Recommendation to avoid child labour has been made, and
Ministry of Works and Transport (MoWT)	<ul style="list-style-type: none"> The ministry has been fully involved from the time of conception in Kalangala hence the MWT is aware of the activities involved. 	Continuous involvement of the MoWT in regards to project information and implementation activities
	<ul style="list-style-type: none"> Access roads should be in line with ministry guideline general standards for roads under this category. 	NOPP design team to ensure that this is apprehended
	<ul style="list-style-type: none"> They guided that if ferries are involved clearance is required from the Ministry of Works and Transport which provides specific guidance in that regard. 	NOPP design team to seek guidance in case ferries are to be used as a means of transport
	<ul style="list-style-type: none"> Road safety measures should be considered during design of access roads following standard guidelines 	This recommendation has been included in the ESMP- Table 9-1.
	<ul style="list-style-type: none"> Considering the targeted number of 2000 out growers with average farm holdings of 2 hectares, requirement for labour was envisaged. The project should have clear, gender, child labour, HIV and COVID management plans. 	The NOPP team to have clear recruitment procedures and means of recording and addressing grievances from workers
	<ul style="list-style-type: none"> Land conflicts have been reported around the proposed project area and these are likely to increase. Caution should be exercised in regard to land ownership issues during enrolment of potential farmers. 	It was noted that small holder farmers do not own land and its in this regard that proper procedures be followed to engage land owners
	<ul style="list-style-type: none"> The project should have and implement alternative activities so as to benefit all community members including those who many not directly participate in oil palm growing. They stressed that the project should have affirmative action for women. Deliberate effort should be made to ensure that women benefit given that majority do not own land 	The NOPP design team to identify alternative activities to implement in form of Corporate Social Responsibility

	<ul style="list-style-type: none"> In regard to the long-term infrastructure plan for the area, the MoWT guided that more information could be obtained from Lake Victoria Transport Plan which includes among others opening up landing sites and enhancing development of water transport. Improvement of roads was reported to be routine and often driven by economic activities or politics. Road upgrade from community access roads to district roads was said to be gradual with details in sector plans. 	The Lake Victoria Transport Plan was reviewed during the ESIA to obtain information relevant to this project.
	<ul style="list-style-type: none"> Concerning the policy for infrastructure improvement where developments are proposed, MoWT is currently focusing on interconnecting areas that present potential for tourism and industrial parks. 	
	<ul style="list-style-type: none"> Road maintenance was reported to be a challenge to districts although the MoWT is engaging government to make the road fund independent so that allocation of resources is as and when required. Currently districts are in charge of maintaining their respective roads. 	The NOPP will liaise with MoWT about the plans for road upgrade in Kalungu District.
	<ul style="list-style-type: none"> Emphasised the need for capacity building for people under the project and participating communities about road safety. Ensure that roads are constructed to recommended standards and road furniture is in place. It was pointed out that road safety had many contributors such as state of the road, skill of drivers and condition of vehicle. 	Safety requirements for inclusion in the road designs and to maintain during their construction and operation are presented in Chapter 8 and 9 and in the ESMP.
	<ul style="list-style-type: none"> The ministry pledged support in regard to engineering, road safety and environment aspects. 	Project management shall seek guidance and continuously engage MoWT on issues regarding engineering, road safety and environment aspects.
Ministry of Gender, Labour and Social Development	<ul style="list-style-type: none"> The need for precautionary measures to be taken to safeguard communities against scenarios of Busoga where farmers dedicated all their land to sugar cane growing. 	Deliberate re-forestation in farming communities is supported and encouraged, growing of legumes as cover crops within the oil palm gardens, conservation tilling (circling) ploughing only around the crop, following the do not harm principle to the dot and slash and burn is totally discouraged.
	<ul style="list-style-type: none"> Oil palm takes a lot of time to grow and there is a risk of farmers dedicating land to it and prices go down when there are bumper harvests. 	Farmers are aware of project implementation time including growth of Oil Palm. NOPP should continuously engage farmers on ways of inter cropping. This is one of the measures suggested in

		chapter 8 and 9 to enhance for security and promote good nutrition
	<ul style="list-style-type: none"> Using Kalangala as a success story may not aid in clearly predicting what could happen on the main land (Masaka Hub) because the former was a fishing community which activity doesn't directly rely on land while the latter is a farming community whose main economic activities (crop farming and animal rearing) are land based. 	There is a NOPP design report on the concept of cultivating Oil Palm on the main land. Furthermore, studies, consultative meetings are underway in search for the best ways the project can be a success on mainland.
	<ul style="list-style-type: none"> Likely influx of workers. Much as the approach will largely target smallholder farmers, extra labour could be required. 	NOPP design team to have procedures such as influx management plan to manage migrant workers from different districts, even outside Uganda
	<ul style="list-style-type: none"> Increased occurrences of child labour although the complexity of separating domestic labour from child labour is likely given that farms shall be owned at family/ household level. 	The NOPP will have clear recruitment procedures and means of recording and addressing grievances from workers
	<ul style="list-style-type: none"> Consultative meetings should include a labour officer before and during project implementation. It was stressed that recommendations in dealing with labour issues should be drafted in consultation with the district labour officer. 	Recommendation regarding labour issues have been provided in Chapter 8 and 9 of this ESIS
	<ul style="list-style-type: none"> Oil palm growing requires a lot of fertilizer usage, hence government should be involved in the purchase, transportation, storage and application following chemical handling procedures. 	The NOPP is being implemented by MAAIF a government agency responsible for overseeing purchase, transportation, storage and application following chemical handling procedures.
	<ul style="list-style-type: none"> Concern was expressed about the likelihood of poor storage and use of fertilisers leading to contamination of neighbouring environs. 	Mitigations measures associated with the storage and handling of fertilisers were proposed in Chapter 8 and 9, and included in the ESMP for the project.
	<ul style="list-style-type: none"> Need for proper training of farmers in chemical handling depending on the type of fertilizers they will be handling. 	The NOPP will provide for training of workers on safe usage and handling of fertilizers as recommended in Chapters 8 and 9.
	<ul style="list-style-type: none"> Routine medical check-up of farmers after exposure to chemicals should be planned for and incorporated into the project design. Medical examination should be after a risk assessment to ascertain the level of risk involved. 	
	<ul style="list-style-type: none"> A list of chemicals/fertilizers should be shared with the ministry for guidance on what is acceptable following the Rotterdam Convention on Chemical Use. 	The list of chemicals/fertilisers to be used for the projects shall be shared by the project management to MAAIF for approval.

	<ul style="list-style-type: none"> Quality PPE should be provided to workers and its proper use enforced. 	Measures to protect workers from harm/un safe conditions have been suggested in the ESMP, Table 9-1 for implementation during project establishment.
	<ul style="list-style-type: none"> Given that the project will involve lifting of heavy objects, skeletal disorder could be reported. Guidance on safe postures for lifting heavy loads needs to be given by trained personnel. 	
	<ul style="list-style-type: none"> Since one of the components is access road construction, a clear traffic management plan should be in place during construction and implementation of the project. Such may include proper signage, flags person, speed limit signs proper loading and off-loading procedures in place and defensive driving training for drivers. 	Subcomponents of the project such as roads will be subject to independent ESIA
	<ul style="list-style-type: none"> If available, an audit report for Kalangala be availed for reference. 	The ESIA team, NOPP design team were availed information and also visited Kalangala for purposes of bench marking
National Environment Management Authority	<ul style="list-style-type: none"> Some parts of the project are within the Wetland. Following the presidential directive of reclamation and conservation of swamps, NEMA will be cautious about areas considered for the project. 	NOPP to liaise with Ministry of Water and Environment to map off segments of the wetland
	<ul style="list-style-type: none"> A suitability assessment should be conducted for the proposed area. 	A land suitability assessment was conducted by NARO, and the results attached to the ESIS as Appendix 4
	<ul style="list-style-type: none"> In regard to the alternative livelihood enterprises proposed by the project to ensure that even those who may not be able to directly participate in oil palm benefit, NOPP was advised to align their proposals with current government efforts to alleviate poverty such as EMYOGA and Parish model to avoid duplication. 	Recommendation was made to the NOPP to integrate the alternative livelihood enterprises into the EMYOGA and Parish model aimed at alleviate poverty.
	<ul style="list-style-type: none"> NEMA advised that the NOPP should clearly point out target areas before the detailed study is undertaken. 	The target areas are the subject of this ESIS.
	<ul style="list-style-type: none"> The smallholder approach could increase vulnerability by members dedicating most of their land to oil palm growing yet it takes long to mature. 	
	<ul style="list-style-type: none"> The authority pointed out that a portion of the proposed project area in Bulingo Village Kalungu has been licenced for sand mining hence should not be included. 	

	<ul style="list-style-type: none"> Advised that government should acquire land in areas away from sensitive ecosystems and establish nucleus estates because these are easier to centrally manage and monitor in terms of environmental compliance compared to smallholder farmers who would be scattered across different parts of the district. 	
Kalungu District officials	<ul style="list-style-type: none"> The outstanding concern expressed was how to convince farmers to move from growing coffee (the known) to palm oil (the unknown). 	NOPP design team to carryout sensitization amongst small holder farmers about Palm Oil growing
	<ul style="list-style-type: none"> They noted that environmental degradation in form of wetland reclamation, forest encroachment and fragile ecosystem encroachment was already a challenge in the district hence the proposed oil palm project could worsen the situation. 	The NOPP design to identify and map off small holder farmers within wetlands
	<ul style="list-style-type: none"> Areas that are ear marked are currently under food crop growing therefore a clear cost benefit analysis must be done to demonstrate that it is commensurate to change from growing currently grown crops to oil palm 	Cost benefit analysis provided by agronomic assessment within the ESIA
	<ul style="list-style-type: none"> They said it was hard to compare or even expect the Kalangala scenario to be replicated without them knowing exactly how the project has affected populations. They requested for a familiarization tour to Kalanga. 	NOPP to present disclose all information used during project design
	<ul style="list-style-type: none"> They wanted to know whether the expected beneficiaries had been identified and consulted 	ESIA has been carried out to disclose information to interested farmers who hope to benefit from the project
	<ul style="list-style-type: none"> District officials wanted to know whether the location for establishment of oil palm nucleus estate had been identified. They were informed that the nucleus is likely to be established in Bukakata 	Alternative sites were identified and reported in the ESIA
	<ul style="list-style-type: none"> Fear of farmers being scattered all over the area because of the smallholder approach that the project intends to use. Guiding principles for the project should be shared with the district so that they are empowered with correct information about the project. 	NOPP design team to engage district officials to help in selection of small holder farmers
	<ul style="list-style-type: none"> They noted that the rice growing project in Lwera uses a lot of fertilizers that are washed into the lake and are causing algae blooms. They feared that the proposed oil palm project could worsen 	Use of fertilisers will be guided by the MAAIF since they are the main implementors of the project

	the situation since a lot of fertilizer application is also involved.	
	<ul style="list-style-type: none"> The proposed site was said to be a low-lying area that is often flooded during the rainy season. 	NOPP design team to revise project implementation procedures especially for areas that are flood prone
	<ul style="list-style-type: none"> District officials advised that farmers be engaged through a beneficiary appraisal so they become more knowledgeable before making any decisions. It was mentioned that income gaps between participating and non-participating households is likely to increase. They said the project should also have alternatives. 	NOPP design team to carryout sensitization amongst small holder farmers about Palm Oil growing
	<ul style="list-style-type: none"> Fear was expressed about the likely loss of biodiversity due to habitat modification. 	There are biodiversity specialists on the ESIA team and will address issues of biodiversity loss and habitat modification during assessment
	<ul style="list-style-type: none"> Change in land use from known food and cash crops might lead to food insecurity in the area due to dedication of available land to oil palm growing 	There are Environment Economists on the ESIA team and will address issues of change in land use during assessment
	<ul style="list-style-type: none"> They expected to get revenue as a district and also achieve improved standards of living for participating households. 	The NOPP is committed to complying to tax proceedings by the district and will support participating households
	<ul style="list-style-type: none"> A conversation ensued to discuss and share the potential sub counties to be targeted. It was agreed that let the three sub counties be considered as part of the project, Bukulula, Lukaya and Rwabenge. 	The NOPP design to modify and include the said sub counties during implementation
	<ul style="list-style-type: none"> The DCDO requested the project manager to share principles/ regulations for the oil palm growing. 	NOPP to present disclose all information used during project design
	<ul style="list-style-type: none"> There should be plans for biodiversity off sets. 	There are biodiversity specialists on the ESIA team and will address issues of biodiversity offsets and plan for restoration
	<ul style="list-style-type: none"> The district team requested for a joint reconnaissance as a district and consultant team to all Sub Counties. 	
Project Affected Persons	<ul style="list-style-type: none"> If one has less than 2ha, shall I be able to benefit from oil palm project? 	Yes, the project targets the rural poor with atleast 1ha but not more than 2ha, though adequate land is needed for food crop farming for food security
Kikoota A, Bugomola Parish, Lwabenge Sub	<ul style="list-style-type: none"> What if I have permanent and perennial crops like bananas and coffee, can I intercrop with oil palm trees? 	Intercropping with oil palm trees is only viable for the first 2-3 years after establishment. Only annual/seasonal crops can only be

County		planted between strips of the oil palm trees.
	<ul style="list-style-type: none"> Is palm oil only restricted to the shoreline and wetland areas only or even the other sites on the mainland? 	<p>No, palm oil grows everywhere as long as the soil and climate conditions favour it. Kalungu district as part of Masaka hub was found suitable for oil palm, but further, soil sampling will be done on individual smallholder farms for this confirmation</p> <p>A buffer of 200m will be left off the shoreline of Lake Victoria, and other areas of HCVs like Katonga wetland and marshlands within the individual farmlands for biodiversity conservation.</p> <p>Marshlands will not be planted with oil palm trees and will be monitored to avoid degradation over time during project implementation.</p>
	<ul style="list-style-type: none"> When adopted and at harvest, will there be a factory for processing in Kalungu district or all the ffbs will be ferried to Kalangala oil mill? 	<p>Yes, however, for the first phase of project implementation, all ffbs from Kalungu and Masaka districts will be felled to Kalangala oil mill</p> <p>A site in Nakigga-Bukakata sub county, Masaka district has been proposed for oil mill establishment for this matter</p>
	<ul style="list-style-type: none"> On the issue of climate variability and change, Kalungu district is affected by this change, will MAAIF support smallholders with irrigation systems for oil palm growth in the early years of establishment? 	<p>It is anticipated that oil palm trees, once established, can withstand long drought spells and other weather extreme events, So, the ministry will not support any smallholder with irrigation systems of whatever kind on their oil palm plantations</p>
	<ul style="list-style-type: none"> Will there be brokers for transporting ffbs to oil mill for processing? 	<p>No, farmers will be tasked to deliver their ffbs to the oil mill individually, however, farmers through associations and the oil palm grower trusts (OPGT) will transport their ffbs in a collective manner to cut transport costs and maximise revenues after.</p>
	<ul style="list-style-type: none"> If farmers form SACCOs, will government support us through loans and other services for oil palm? 	<p>Yes, the current NOPP is supporting smallholders through a loan from IFAD and private partnerships, the aim is to raise incomes of the rural poor</p> <p>Other support, through the oil palm grower trusts (OPGTs) will include extension services, access and</p>

		farm roads construction, information on prices and ffbs quality among others
	<ul style="list-style-type: none"> How many kilograms does each oil palm yield? 	This depends on how well the crop is tendered. If well cared for on bunch can be approximately 20-25kg
	<ul style="list-style-type: none"> Does the oil palms do well in the wetland? 	The ESIA study seeks to guide development that is in line with existing laws and regulations. According to NEMA regulations, wetlands are supposed to be protected hence no farms shall be established in wetlands.
	<ul style="list-style-type: none"> How shall inputs pre-financed by government be paid for? 	NOPP who are in charge of implementing the project will come and explain the terms exhaustively during registration of potential farmers. Usually an agreed percentage is deducted from a farmers harvest until the loan advanced in form of inputs is completed.
	<ul style="list-style-type: none"> What period does the oil palm take to mature? 	Oil palm matures in 3-4 years.
	<ul style="list-style-type: none"> Will the project support farmers to clear the land for those that cannot afford? 	Farmers interested in the project will be supported through provision of inputs like fertilizers, and seedlings among other benefits.
	<ul style="list-style-type: none"> Can farmers with land holdings smaller than 2 hectors participate? 	The intention of setting a minimum threshold was to ensure that farmers have some land to continue with other livelihood activities because oil palm takes 3-4 years before maturity
	<ul style="list-style-type: none"> How can farmers be sure that the market prices do not decline if oil palm is produced massively? 	Because government is involved the demand for oil palm in the country is big. Setting of oil palm prices is streamlined and every month a new price is set following certain criteria.



Kitooka Village, Lwabenge S.C



Kalangala Village, Bukulula S.C



Bajja/Bugweri Village



Kalungu District meeting

Figure 0-1 Pictorial view of some of the stakeholder meetings conducted during the ESIA.

Table 0—3 Response to the approval of the Terms of Reference for the ESIA

No.	NEMA condition of approval of the ToR for this ESIA	Responses by ESIA Team
1	You have mobilized 24 smallholders unite, as per the GPS coordinates. However, you are silent on the total acreage of these units relative to the target 3,000 hectares for the hub, and not clear whether indeed you are no longer mobilizing smallholders in Kalungu District	The ESIA team with help of the client and the Kalungu District leaders, have identified and mapped equivalent to 81 acres the potential small holder farm sites MAAIF in the process of mobilising additional smallholder farmers..
2	You provided GPS points but these cannot allow us generate polygons for use to determine whether the farm shown to be near wetlands are actually not in wetlands	An updated list of smallholder farmers with four corner mark GPS coordinates is attached to this report as Appendix 3.
3	Generate GPS coordinates of each unit and liaise with the Wetlands Management Department, in the Ministry of Water and Environment, to map the wetlands in the project area. Using the wetlands data, eliminate all those units shown to be in wetlands, and only undertake assessment for those on dry land, assuming these make the targeted area for the hub. In addition, work with agronomists at the National Agriculture Research Laboratory to assess the suitability of the project land for oil palm cultivation. Be sure to use the wetland map and the land suitability assessment to develop a land use plan of smallholder fields. You are advised to consult Kalungu District Local Government, this Authority and the Ministry of Lands, Housing and Urban Development, when developing this plane, and be sure to make use of these data during the assessment.	The coordinate of the assessed potential smallholder farms attached to this report as Appendix 3. A meeting was held with WMD on 8 th August 2022 to obtain their feedback in regard to the NEMA requirement. Feedback is awaited. NARO has also been engaged in relation to the preparation of the land suitability report. Feedback is awaited.
4	Undertake comprehensive evaluation of all potential impacts and risks associated with the proposed project activities in the area, and include an exhaustive environmental and social management plan (ESMP), discussing ways in which the potential environmental and social impacts arising from project activities will be mitigated at every stage of project implementation.	Chapter 8 and 9 provide the detailed impact and risk evaluation and the ESMP respectively.
5	Append to the ESIA report GPS coordinates of the boundary of the wetlands in the project area	The GPS Coordinates of the boundaries of the wetlands in the project area is awaited from WMD
6	Append to the ESIS the land suitability report and land use map	See Appendix 5
7	Append to the ESIA report a list of all the smallholders who have agreed to participate in the project, proof of agreement and terms of	An updated list of smallholder farmers with GPS coordinates is attached to this report as Appendix 3

	engagement, and legible copies of land ownership documents for each smallholder	
8	Include the cost of the project based upon estimates from a certified valuer, in accordance with Regulation of the National Environment (Environment and Social Assessment) Regulations, S.I. No.143/2020	This has been included in section 2.4 of this report.
9	Accompany the ESIA submission with evidence of payment of 30% ESIA fees, in accordance with Regulation 49 of the National Environment (Environment and Social Assessment) Regulations, S.I.No.143 of 2020.	<i>MAAIF will avail the evidence of payment of the 30% ESIA fees</i>

6.4 Grievance Redress Mechanism (GRM)

A grievance redress mechanism is a process for systematically receiving, investigating and responding to community complaints associated with a project activity. When carefully designed, properly implemented and embedded in an effective community engagement program, the mechanism shall provide significant benefits to both the Project and communities in which it operates.

A grievance management process will be established for the project. This will provide a formal and on-going avenue for stakeholders to engage with the project. A project-level grievance mechanism is a locally based, formalized way for a company or project to accept, assess, and resolve stakeholder complaints related to project activities. It offers a package of widely understood and effective procedures for solving problems in a culturally appropriate manner. The grievance mechanism will be announced to affected stakeholders so that they are aware of the process, know they have the right to submit a grievance and understand how the mechanism will work and how their grievance will be addressed. In most cases, a grievance or complaint will be submitted by a stakeholder or local resident by phone, in writing or by speaking with one of the project proponent's representative officers.

Proposed GRM

It is understood at the current stage of the project a formal mechanism for managing community complaints has not been established. Although the project will seek to reduce potential negative impacts arising from the project, it is inevitable that community queries and grievances will arise throughout the project implementation phases. For these reasons, a Grievance Tracking and Redress Mechanism (GTRM) should be established. The GTRM will be triggered in all instances where a complaint is received by the project proponents or its contractors. A typical GTRM is characterized by five basic steps illustrated and further detailed in Figure 7-3 below.

Figure 0-2: Basic Steps of Grievance Tracking and Redress Process

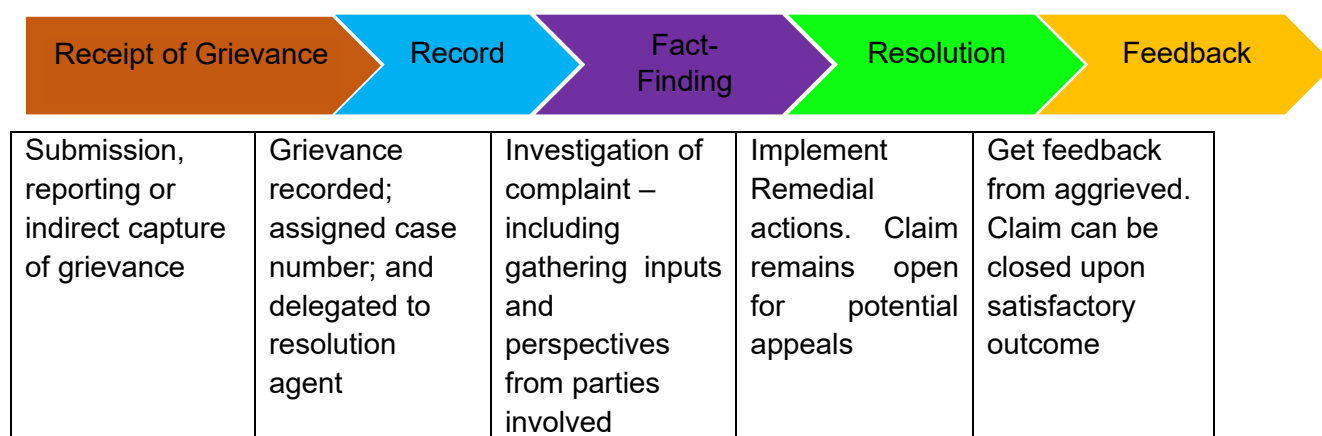
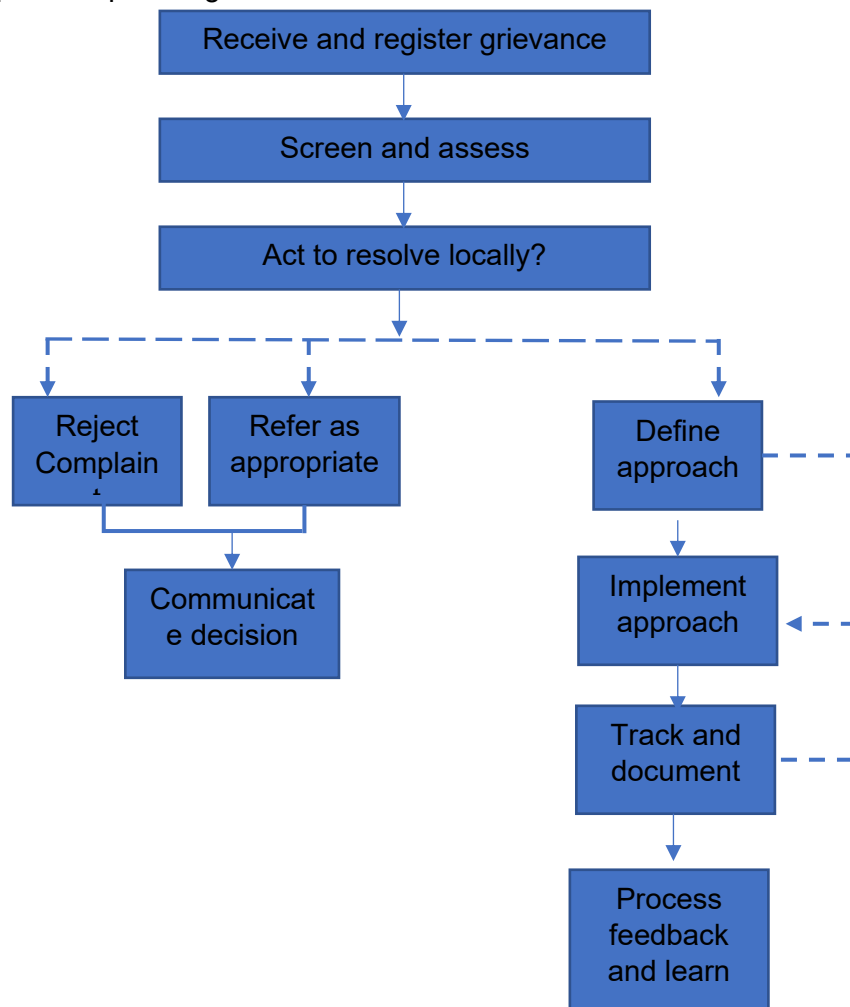


Figure 0-3: Typical Steps of a grievance mechanism



Complaints and grievances can be directed to the Social Development Officer (SDO) or through the LC1 chairman who then conveys them to the SDO. The dedicated SDO will then have the responsibility to monitor the resolution progress, record all discussions and ensure all grievances are responded to where feasible in a timely and proper manner. To the greatest extent possible the project will treat community complaints confidentially, and in all cases, grievances will be addressed without prejudice.

Dedicated resources for managing community grievance mechanism

The grievance mechanism will be effective if adequate resources (people, systems and processes, and associated financial resources) are assigned to its implementation, and if responsibilities are clearly defined. The mechanism should be recognised as part of the project's function. Table 7-4 summarises the basic roles and responsibilities required to implement the grievance management.

Table 0—4: Summary of Roles and Responsibilities

Environment, Health and Safety Officer (EHS)
<ul style="list-style-type: none"> Reporting to the Operations Manager, the primary responsibility of the EHS Officer will be to ensure that good EHS practices are followed by all smallholder OPs supported by NOPP. To do so, the NOPP EHS officer will collaborate closely with the Private Sector's EHS officers in the setting of technical standards, and provide guidance to the OP Hub's EHS focal points in terms of organizing EHS days and further follow up. The NOPP EHS officer will be responsible for convening the EHS Practitioners Group and collecting relevant data to inform the Impact Monitoring System. Finally, the EHS Officer will be responsible for the effective execution of ESIA's and the SEA.
Social Development Officer (SDO)
<ul style="list-style-type: none"> Reporting to the Operations Manager, the Social Development Officer is responsible for ensuring high standards of social performance of NOPP operations at all stages of the project cycle. This will entail managing all social activities considered under the Project, using data and learning from the field to fine-tune Project strategies, and feeding Project learning around social inclusion, youth and gender mainstreaming to local and national policy dialogue.

7.3.2 Monitoring and Reporting of Grievances

An internal monitoring process will be conducted to monitor the effectiveness of the Grievance Mechanism. Internal monitoring will be undertaken on a regular basis. The monitoring process is designed to identify areas of high performance and areas for improvement to enhance the process. The scopes of the monitoring include:

- Assessing the effectiveness of the grievance tracking and handling procedure;
- Identifying the need for organisational improvement in implementing the procedure;
- Evaluating the progress of resolution implementation and identify intervention needs from the project management to manage overdue or outstanding cases or recurring grievances; and
- Identifying the need for improvement of the procedure, should any significant changes in external factors occur, e.g., economic and political conditions which potentially encourage additional social risk and impact.

Periodic reporting will be prepared by the SDO or persons within the organisation with a similar role with the following timeframe:

- Monthly reporting will be submitted to the senior management or the operations manager as a reference in the coordination meeting with the EHS officer and Private Sector's EHS officers; and
- Quarterly reports to be submitted to each of the project's management and distributed to other relevant parties as required to identify the need for organisational and procedure improvement.

The content of the report will at minimum contain the following information:

- Summarise the grievances received and classification based on the grievance type within the timeframe;
- The resolution status – number of grievances resolved, pending of implementation and unresolved, along with challenges in implementing the resolution, and timeframe to resolve the remaining grievances;

- Results of monitoring and the status of implementation of the proposed recommendation; and
- Identify trends and critical grievances occurring regularly or overdue cases.

7.3.3 Disclosure of Grievance Mechanism

The disclosure and communication of the grievance mechanism will begin early in the project lifecycle and continue on an on-going basis as grievances arise. It will be disclosed in a culturally appropriate manner in the local language and format that is understandable to all project affected peoples.

The following information will be disclosed (internally and externally)

- Steps of Project-based Grievance Mechanism;
- Who can raise complaints – focusing on the affected communities;
- Where, when, and how community members can submit complaints;
- Who is responsible for receiving and responding to complaints, and if any external parties can receive complaints from communities; and?
- What type of responses complainants can expect from the Project including timing of response?

In regard to disclosing the mechanism, the project will undertake communication in group discussions, community meetings and through the project's SDO as well as by using other communication tools. It is essential that the local government and all relevant stakeholders also fully understand the mechanism to enable them to communicate the step-by-step process to the project affected peoples, particularly in the case where the grievances are submitted to them for resolution.

8. ASSESSMENT OF IMPACT SIGNIFICANCE AND PROPOSED MITIGATION MEASURES.

The establishment of small holder oil palm plantations will be associated with both positive and negative impacts and risks which are likely to occur with different intensity and scale.

Potential environmental and social effects/risks of the project on the physical, biological, and socio-economic environment during the construction and operations phases were identified and analysed to determine the impact significance, using the method detailed in section 3.6 of this report. Cumulative environmental and social effects that are likely to result from the project in combination with other projects or activities in the project area have also been identified.

A summary of the identified environmental and social impacts and their overall significance is provided in Table 8-1 below:

The process involved:

- Identifying all the positive and negative impacts/risks that are likely to arise from the project activities;
- Assessing the magnitude of the impacts in terms of extent, duration, acceptability and mitigability;
- Proposing mitigation measures to reduce those impacts to acceptable levels.

Emphasis was placed on significant impacts/risks and these were described, assessed and mitigation actions suggested.

8.1 Project positive impacts

8.1.1 Direct Employment opportunities

Activities preceding establishment of farms (nucleus and smallholder) and the proposed mill will require workers. Oil palm growing being a new venture in Kalungu district and given the associated labour requirements, it will certainly create job opportunities for a sizeable number of people. Provision of jobs to the unemployed would boost their incomes and improve their standards of living. People will work as farm casual workers and drivers among others. Job opportunities created will generate income for those employed. In turn, the steady income flow could compel farmers to make long-term decisions of investment.

The value attached to direct employment opportunities to the people is **high** given that employment opportunities are generally scarce. The severity of the impact is considered **medium** because the work duration will be long enough to positively change the lives of the receptors of the impact. The impact will be long term since the project is expected to last over 25 years. However, the impact will be **regional** as many people from other areas will also benefit from the available job opportunities. The probability of the impact occurring is **high**. The magnitude of the impact on job opportunities is therefore assessed as **High** positive. The overall impact assessment is hence **large positive**.

Enhancement measures

- Determine numbers of skilled, semi-skilled and unskilled labour requirements for each phase and assess local resource levels through involving local council chairmen, subcounty and district leaders.
- Timely and continuous information dissemination about the existing job opportunities and any other opportunities besides the jobs such as sourcing of materials and supplies. The contractor will use effective communication methods so as to ensure that the message reaches the intended people.
- The Contractor will provide fair working conditions and environment as required by the Employment Act e.g. workers will be allowed to rest, take leave e.g. annual, sick leave,

provided with fair pay, contracts etc. MAAIF will approve the Worker's Recruitment Plan including the proposed wages for the workers.

- Implement project specific training and community development programs to increase the skills of farmers and workers.
- The contractor will present a transparent Worker's Recruitment Plan. The recruitment procedures must provide equal opportunity for all including females. The Plan should be clear on the working conditions and terms of employment
- The Contractors will be obligated to work within Uganda's labour laws (The Occupational Safety and Health Act, 2006, Employment Act, etc), including restrictions on child labour especially where it can interfere with the child's education. Children below 18 years of age will not be employed on the project.
- The Contractor will prepare and implement and Sexual Harassment Policy or Plan so as to avoid any kind of sexual harassment for the workers.

6.4.1 Improved Income

It is expected that once the project is embraced, farmers will realize increased income from the sell of oil palm. According to information gathered from KOPGT an umbrella body for out growers in Kalangala, incomes of participating households were reported to be better than those of non-participating households, hence better living standards. This will likely be the same in Kalungu District. Besides the direct benefits, there are indirect benefits, the most likely being establishment of petty trade in villages where oil palm growing shall be undertaken. For example, in Kalangala, according to the chairperson Kalangala Oil Palm Growers' Trust, out growers get on average an aggregate of 5bn shillings per month. This is much higher than income of average subsistence farmers in Uganda. If identified communities embrace the new venture, the project will go a long way in reducing the poverty levels among oil palm growing households and the region at large.

The value attached to improved income is **high** given that people in the area are generally low income earners. The impact duration will be **long term** since the project is expected to last over 25 years. However, the impact will be **international** since both local and foreign firms buying the oil palm products will benefit. The probability of the impact occurring is **medium**. Thus, the magnitude of the impact is therefore assessed as **High** positive. The overall impact assessment is hence **large positive**.

Enhancement measures

- During the sensitization meetings with local communities, the smallholder farmers need to be informed about the project likely benefits exhaustively so as they can weigh options for their sources of income.
- Provide adequate and timely information about available supply opportunities so that those interested can apply for them.
- Service providers should be paid in a timely manner.
- Local suppliers should be given first opportunity

8.1.2 Improved Infrastructure

The proposed project will improve on existing access roads and open up new ones to areas where oil palm farmers will be located. This is aimed at improving access to the various sections of the palm plantation and for delivery of oil palm to the processing plant. Much as the established roads will serve the principal purpose, they will also ease movement for the local community.

The value attached to this impact is **medium**. The impact duration will be **long term**. The impact extent will be **local**. The probability of the impact occurring is **medium**. Thus, the magnitude of the impact is medium positive. The overall impact assessment is hence **medium positive**.

Enhancement measures

- Road safety measures should be considered during design of access roads following standard guidelines.
- Access roads should be in line with ministry guideline general standards for roads under this category.
- Liaise with district in line with upgrade of access road so as conform with the district infrastructural plans.

8.1.3 Widened revenue base

This will arise from increase in quantities of crude oil produced hence increase in products generated and thus increase in the revenue base for Uganda as a country and thus improved socio-economic development.

8.1.4 Skills Development

The unskilled and semi-skilled workers employed by the project project implementation, will acquire new skills, knowledge and experience. The unskilled workers like casual laborers are likely to rise to other levels. Workers will be exposed to better techniques and work methodologies which will benefit the local population and country at large during and after the project life. Although this is a long-term impact, only a few workers will be working on the project.

Enhancement measures

- Provision of training programmes should be spearheaded by the developer.
- Farmers and mill operators should deliberately attach some unskilled workers to the project

8.1.5 Land restoration of previously unproductive areas

It is anticipated that implementation of the NOPP will greatly contribute to restoration of unproductive areas through growing palm oil in these areas.

The value attached to this impact is **medium**. The impact duration will be **long term**. The impact extent will be **local**. The probability of the impact occurring is **high**. Thus, the magnitude of the impact is **medium** positive. The overall impact assessment is hence **medium positive**.

Enhancement measures

- Identify, demarcate, these unproductive areas in the district that can be utilised for Palm Oil growing
- Prevention of loss of soil fertility through intercropping
- The planting of cover crop immediately after land clearing will minimize the erosion to a great extent through reducing the spread of surface run-off. Furthermore, cover crops have a mechanism of adding nutrients to the soil thus improving its fertility.

8.1.6 Prevention of loss of soil fertility through intercropping

The planting of the cover crop immediately after land clearing will minimize the erosion to a great extent through reducing the spread of surface run-off. Furthermore, cover crops have a mechanism of adding nutrients to the soil thus improving its fertility.

Enhancement measures

- Creating awareness to smallholder farmers about sustainable farming practices such as intercropping
- Carryout an assessment to identify the best alternative cover crops that can be planted alongside Palm Oil
- Provide the identify cover crops seed to smallholder farmers to encourage them practice intercropping

8.1.7 Increase in biomass due to increase in vegetation cover

In the long term, there will be an increase in vegetation cover due to implementation of the project. Mature stands of oil palm trees tend to have a high biomass than forest type (pines, grasslands and *Eucalyptus*). This can diversify biomass options and reduce pressures on natural forests.

Enhancement measures

- Encourage planting of degraded grassland areas
- Planting oil palm on abandoned/ underutilised land improves soil conditions and land coverage, providing GHG mitigation and increasing the accumulation of carbon stock. Oil palm plantations may act as a Carbon sink as they assimilate more CO₂ and release more oxygen (O₂) than tropical forests and grasslands and considering the amount of land required and the fact that the proposed project land is under cultivation with few trees and forest patches, the plantations will improve on the area climate.
- Identify green zones/belts within the farms to supplement generation of carbon sinks to the plantations.
- Undertake restoration works by say planting other tree species around individual farm lands.
- Sensitize the community on the benefits of oil palm growing especially on the micro environment of the area
- Project will divert people's effort away from fishing thus reducing the pressure from the natural water bodies and allowing fish numbers and size to rejuvenate
- Promote adoption of oil palm project by the district and NOPP focal person.
- Sensitize the community on the benefits of oil palm growing especially on the micro environment of the area

8.1.8 Recovery of archaeological materials

The project is expected to yield archaeological materials especially project activities that involve ground disturbance such as construction of access roads, oil palm mill and pits for oil palm plantation. This is a high positive impact as it helps to fill gaps within the archaeology history of the area. It should be noted that archaeological materials by their nature occur below the surface.

Enhancement measures

- The contractors involved in project implementation should work hand in hand with professional archaeologist(s) in site selection to help identify and gazette already know archaeological and cultural heritage sites. Also, activities that involve ground

movement which is common in agriculture should be monitored and materials salvaged.

- Local residents should be trained on site protection strategies and handling of valuable artefacts.
- The project is expected to help provide exposure to the archaeological and cultural resources in the area thereby facilitating cultural tourism and conservation.
- The communities should be motivated so that they are able to protect, preserve and conserve their own heritage alongside development.

8.1.9 Exposure to archaeological and cultural resources

The project is expected to help provide exposure to the archaeological and cultural resources in the area thereby facilitating cultural tourism and conservation.

Enhancement measures

- The communities should be motivated so that they are able to protect, preserve and conserve their own heritage alongside development.

8.1.10 Climate regulation

Planting oil palm on abandoned/underutilised land improves soil conditions and land coverage, providing GHG mitigation and increasing the accumulation of carbon stock. Oil palm plantations may act as a Carbon sink as they assimilate more CO₂ and release more oxygen (O₂) than tropical forests and grasslands and considering the amount of land required and the fact that the proposed project land is under cultivation with few trees and forest patches, the plantations will improve on the area climate.

The value attached to this impact is **medium**. The impact duration will be **long term**. The impact extent will be **regional**. The probability of the impact occurring is **medium**. Thus, the magnitude of the impact is medium positive. The overall impact assessment is hence **medium positive**.

Enhancement measures

- Identify green zones/belts within the farms to supplement generation of carbon sinks to the plantations.
- Undertake restoration works by planting other tree species around individual farm lands.

8.2 Negative impacts from site clearance, preparation, and palm oil planting

8.2.1 Change in land use

The land take impact associated with the implementation of this project will also result in displacement of people in areas where economic activities are being conducted such grazing

Mitigation measures

- Seek Consent from people owning land on which Palm Oil will be grown.
- Pre and post assessments (valuation) be made to facilitate smallholder farmers take on a decision on whether to engage in Palm Oil growing
- Put in place a grievance mechanism led by Social Development Officer and district community officer and grievance register for recording complaints from PAPs

8.2.2 Conflicts between workers and community

Conflict is likely to occur between communities and workers who might be brought in to work on plantations. This is likely to result from interaction and introduction of new ways of life

divergent from known local social norms and practices. Conflict could occur within communities, due to the income gap created when some experience increased income from participation in oil palm growing compared to their non-participating counterparts.

Mitigation measures

- Develop guidelines for behavioural conduct, including penalties. This should be reflected either as independent document or component to the NOPP Human Resource Manual.
- Workers must be sensitized on proper social behaviour and conduct with regard to community norms prior to starting work; workers should be sensitized to avoid engaging in sexual relations with underage girls and married women.
- In case of misunderstandings between workers and the local community, use of local leadership should always be sought as a first priority in solving these issues; alternatively, the Grievance Redress Committees can be used to address grievances. Opportunities of collecting community grievances through community meetings, establishment of a grievance logbook at each project site and suggestion boxes should be established.
- Similarly, in liaison with local leaders, NOPP should prepare local communities – psychologically and otherwise – for the newcomers; efforts be focused on instilling attitudes of tolerance, support and understanding towards the newcomers in the local communities.

8.2.3 Nutritional Disorders

The proposed oil palm growing could have negative impacts on nutrition by way of reducing available land for food farming and change in feeding habits as a result of improved income. This would contravene IFAD's main aim of improved nutrition among rural communities and improved food quality, which are in tandem with SDG2, which aims to end hunger, achieve food security, improved nutrition, and promote sustainable agriculture by 2030.

Mitigation measures

- Encourage smallholder farmers to practice intercropping palm oil with other food crops
- Carryout training programs to educate smallholder farmers on best farming practices to mitigate nutritional deficiency

8.2.4 Dependency on the nucleus farm

Smallholders as defined by the RSPO as working on plantations of less than 50 hectares, account for a significant proportion of palm oil production wide and in Africa; they are the majority producers of oil palm. However, proposed management arrangement will most likely make smallholder farmers dependent on the larger anchor project given that loans issued have to be paid over a long period.

Mitigation measures

- NOPP should identify land and grow its own Palm Oil rather than entirely rely on smallholders
- Create incentives that encourage a large number of smallholder farmers to participate in the project to achieve sustainability.

8.2.5 Labour Issues

Child labour is a common problem in other oil palm growing countries such as Malaysia and Indonesia. Given the approach of smallholder farmers, it will be complex to separate domestic labour from child labour. Very often children participate in oil palm cultivation but receive little or no pay and are often forced to endure harsh working conditions including long hours and exposure to chemicals in form of fertilizers and pesticides. All the above have associated direct and indirect health risks.

Mitigation measures

- Determine numbers of skilled, semi-skilled and unskilled labour requirements for each phase and assess local resource levels through involving local council chairmen, Sub-County and district leaders
- Implement project specific training and community development programs to increase the skills of farmers and workers
- The Contractors will be obligated to work within Uganda's labour laws (Employment Act), including restrictions on child labour especially where it can interfere with the child's education.

8.2.6 Disruption of current sources of livelihoods

The ESIA revealed that a sizeable number of households' areas where the project is to be implemented are pastoralists who use part of the targeted project area for this activity, embracing this new enterprise would therefore mean diversion from the existing way of life. Dedicating part of the area to oil palm growing would also mean limiting land available for animal grazing. In addition, besides grazing, there are resources such as water, firewood, honey and fish that are directly derived from the area earmarked for establishment of a nucleus farm whose access to shall be restricted.

Mitigation measures

- The Project Affected Persons (PAPs) should be given adequate notices so that they can plan their activities appropriately.
- Meetings should be held in locations that are easily accessible and close to the targeted community members so that the least inconvenience is subjected.
- Alternative arrangements for cattle grazing should be assessed.

8.2.7 Increase in spread of HIV/AIDs and other STIs

Interaction among farm workers, oil palm factory workers and the project host community could lead to escalation of the HIV/AIDS cases. HIV is known to have significant long-term impacts on the infected and affected community members. The at-risk populations vulnerability status is hiked by drivers such as social status of women, cultural practices, poverty, poor nutrition, money, alcohol, power and such as already weakened immune systems from other diseases. On the other hand, STIs although curable can increase the risk of HIV acquisition threefold or more, and can have serious consequences beyond the immediate impact of the infection itself, the spread of HIV and other STI tend to be high in commercial farming communities due to risky sexual behavior.

Mitigation measures

- Orient all workers on safe work practices and ensure that they are adhered to.

- Safety training be conducted routinely on how to prevent and manage incidences on site, and measures to protect the general public from construction site hazards
- Have in place safe work procedures to be followed during project implementation to ensure safety of the community as well as the workers

8.2.8 Influx of people from migrant workers

Influx of people is likely to bring in social imbalances as it is always mainly characterized by males. This coupled with increased income realized from sale of oil palm or working on the fields increases available disposable income. This based on the Kalangala experience increased prostitution and its attendant ills mainly HIV and other STIs. Similarly, increase in population that is not matched to increased services will certainly increase pressure on existing social infrastructure such as schools, health centers and water sources.

Mitigation measures

- Develop guidelines for behavioural conduct, including penalties. This should be reflected either as independent document or component to the NOPP Human Resource Manual.
- Workers must be sensitized on proper social behaviour and conduct with regard to community norms prior to starting work; workers should be sensitized to avoid engaging in sexual relations with underage girls and married women.
- In case of misunderstandings between workers and the local community, use of local leadership should always be sought as a first priority in solving these issues; alternatively, the Grievance Redress Committees can be used to address grievances. Opportunities of collecting community grievances through community meetings, establishment of a grievance logbook at each project site and suggestion boxes should be established.
- Similarly, in liaison with local leaders, NOPP should prepare local communities – psychologically and otherwise – for the newcomers; efforts be focused on instilling attitudes of tolerance, support and understanding towards the newcomers in the local communities.

8.2.9 Vulnerability as result of gender related issues

Based on the presented gender disparities that prevail within the region, like most parts of the country because of the patriarch nature of societies, it is likely that women, widows, the old and children shall be marginalized. This prediction is based on the fact that land which is a primary input into the project is owned by men. It should also be noted that much as women and children are primary producers in the agriculture sector, they do not own, control or make decisions related to land hence are at the verge of being left without land for production of household food crops.

Mitigation measures

- Determine numbers of women who are willing to participate in Palm Oil growing and assess how best they can be included in the program through involving local council chairmen, Subcounty and district leaders.
- Conducting training and awareness programs aimed at gender equality during project implementation.
- Have in place a framework for compulsory inclusion of women to participate in the NOPP.

8.2.10 Shift in crop type growing

The proposed oil palm growing could have negative impacts on food security by way of reducing available land for food crop farming and change in amount of food crops grown thus causing food insecurity.

Mitigation measures

- Encourage smallholder farmers to practice intercropping palm oil with other food crops
- Carryout training programs to educate smallholder farmers on best farming practices to balance growth of Palm Oil and food crops.

8.2.12 Loss of invertebrate fauna as a result of weeding

During weeding, especially application of herbicides, invertebrate fauna may be killed as a result of exposure to harmful chemicals

Mitigation measures

- Devise ecological sound procedures of weed control to prevent loss of invertebrate fauna

8.2.12 Climate change

Oil palm plantation contributes to greenhouse gas emissions through land use change due to the difference in carbon sequestration between the palm oil plantation and the land use it replaces (Schrier-Uijl et al. 2013).

Mitigation measures

- Have a phased implementation plan for Palm Oil growing so as harmonise effects brought about by carbon sequestration due to change in land use.

8.2.13 Plant species diversity decline

The impact of clearance on biodiversity depends on its biogeographic significance and conservation status. The oil palm plantations are monocrops, dominant woody perennial stands reducing species diversity on farm.

Mitigation measures

- Continued and directed surveys in pristine sections of forests and wetlands
- Collection of voucher specimens of interest species for confirmation of identifications at herbaria in case they are thought to be new species
- Adequate inspection of the participating farmers land should be done before land clearance
- Species composition and relative abundance need to be monitored in both the converted areas and natural areas
- Vegetation offsets through plantation establishments on designated land by the Kalungu DNR or NFA
- Establish nurseries for indigenous tree species to be given to farmers for farm boundary planting or woodlot establishment.

8.2.14 Decline in natural habitats mostly forest, and wetland areas

The immediate effect of vegetation clearance on species can be significant. This leads to habitat loss and fragmentation with associated edge effects. It is anticipated that there will be a decrease in species richness and abundance due to the gradual clearing of wooded bushlands within the project area.

Table 8—1: Vegetation identified on some sampled farms in Kalungu District

Location/ farm	Environmental baseline
<p>Bukeeri Village</p> <p>364400, 9950574 364402, 9950456 364402, 9950450 364391, 9950485</p>	<p>Farmland dominated by bushlands and thickets, with a few scattered trees of <i>Eucalyptus sp</i>, <i>Maesopsis eminii</i>, <i>Harugana madagascariensis</i>, <i>Ficus natalensis</i>, <i>Lovoa swynnertonii</i>, <i>Neoboutonia macrocalyx</i>, <i>Ficus exasperata</i>, <i>Beilschmiedia ugandensis</i>, <i>Vernonia sp</i>, <i>Erythrina abyssinica</i>, <i>Psidium guajava</i>, <i>Dichrostachys cinerea</i>, <i>Dovyalis macrocalyx</i>, <i>Sida sp</i>, <i>Acanthus sp</i> and <i>Senna didymobotrya</i></p> <p>Grass species included <i>Cymbopogon nardus</i>, <i>Cynodon dactylon</i>, <i>Eragrostis sp</i></p>
<p>Bukeeri Village</p> <p>Ssenyonga Expedito</p> <p>363317, 9950003 363335, 9949992 363342, 9949949 363321, 9949966</p>	<p>Farmland under open cultivation, with <i>Mangifera indica</i>, <i>Eucalyptus grandis</i>, <i>Persia americana</i>, cassava and weedy plants comprising of herbs and forbs (<i>Bidens pilosa</i>, <i>Sida sp</i>, <i>Commelina banglensis</i> among others</p>
<p>Bukeeri Village</p> <p>Ssenyonjo Lawrence</p> <p>363346, 9949947 363356, 9949931</p>	<p>Bushland largely dominated by shrubs and herbs vegetation. Species recorded included <i>Acalypha sp</i>, <i>Coffee robusta</i>, <i>Lantana camara</i>, <i>Mangifera indica</i>, <i>Grevillea robusta</i>, <i>Dracaena fragrans</i>, <i>Elaeagnus angustifolia</i>, <i>Ozoroa insignis</i>, <i>Senna occidentalis</i>, <i>Stachytarpheta indica</i>, <i>Harugana madagascariensis</i>, and <i>Sida sp</i>.</p>
<p>Bukeeri Village, in Kanywa Parish, Buwunga S/C</p>	<p>Nabukonge Forest Reserve</p> <p><i>Eucalyptus</i> spp woodlot in pure stands, with few mosaics and fragments of a secondary natural forest seating on Narozari catholic church land</p> <p>The natural forest species recorded included, <i>Pycnanthus angolensis</i>, <i>Maesopsis eminii</i>, <i>Sapium ellipticum</i>, <i>Blighia unijugate</i>, <i>Entandrophragma angolense</i>, <i>Cordia africana</i>, <i>Sesbania sesban</i>, <i>Cajanus cajan</i>, <i>Dalbergia melanoxylon</i>, <i>Smilax anceps</i>, <i>Maesa lanceolata</i>, <i>Antiaris toxicaria</i> and <i>Spathodea campanulata</i></p> <p>Saplings of <i>Markhamia lutea</i> were evident in the Eucalypts sites</p> <p><u>Forest boundaries</u></p> <p>363588, 9951526 363510, 9951374 364426, 9952359; 364422, 9952313; 364083, 9952142</p>

Mitigation measures

- Accurate information on extent and quantity and quality of representative habitats (Forests, wetlands, grasslands and shrub land)
- Some areas of natural habitat types need to be maintained in the plantation areas
- Control access to wetlands by feral animals like cattle, to reduce destruction of breeding grounds of fish

- Support catchment management works to foster wetland rehabilitation and their wise use by the participating communities/farmers
- Habitat for endemic or restrict range species should be protected where it is established the species exist in the project area. However, it is important regionally and globally for biodiversity conservation. Key species such as Sitatunga (*Tragelaphus spekei*), Grey Crowned
- Crane, Shoebill, papyrus endemic species such as Papyrus Gonolek and Papyrus Yellow Warbler are known from this site and hence the site is important in maintaining the biodiversity of these species
- To areas around Katonga wetland, a 100m wide strip of riparian buffer zone shall be maintained to avoid wetland encroachment and subsequent degradation
- Integrate remote sensing technology to monitor land use and cover change following the implementation of oil palm project to counteract encroachment into these pristine and fragile ecosystems

8.2.15 Decreased availability of forest products

When the oil palm project reached its peak, there will be less forested land and therefore, availability of forest products such as fuel wood, charcoal, timber will decrease. This is bound to increase the cost of living in Kalungu district as prices of various products rise.

Mitigation measures

- Encourage forestation and afforestation programmes among the participating communities to ensure sustainable utilization of forest resources for production
- Improve agricultural extension services
- Promote more food campaign programs by CBOs, local government departments and NGOs

8.2.16 Decline of energy resources/ increase in charcoal burning practices

In the early stages of project adoption/uptake by smallholders, it is anticipated that land will be cleared for oil palm planting, charcoal burning practices could be on the rise in the short run.

Mitigation measures

- Establish awareness programmes on energy saving stoves
- Support agroforestry practices on enhance wood fuel farm production as an option to the declining energy sources

8.2.17 Soil erosion

During project implementation vegetation clearance will be undertaken and will result into habitat modification and will bring about soil erosion and wetlands sedimentation especially during rainy season, loss of hiding grounds, feeding grounds and breeding grounds. Dislodged soils during land preparation for planting and infrastructure development may be washed into the downstream water bodies by storm waters and cause siltation resulting into higher water turbidity which when combined with reduce light penetration, leads high rates of algae growth. Furthermore, silt may cause fish deaths due to clogging of their gills. Ploughing and land clearing may expose the surface topsoil to runoff which results in washing away of surface soil particles leading to erosion and soil degradation. Bare soil resulting from road construction and other infrastructure such as culverts, and drains increases soil erosion in oil palm plantations.

Mitigation measures

- Trenching shall be done during the early stages of oil palm establishment due to the large gap sizes to foster water retention, soil stability and water penetration
- Practice mulching and adding organic fertilizers or compost to the soil
- Ensure proper disposal of woody debris generated especially during site clearance
- Plant cover crops over time for example, *Mucuna bracteata*, a leguminous plant that does not only add Nitrogen to the soil but reduces impact of soil friability reduce soil erosion proneness.
- Install sediment traps and adoption of soil and water management practices on site
- Ensure visual and on-spot inspection of project area

8.2.18 Impacts on Fauna

Fauna in general have been observed to be affected by habitat modification and destruction that paves way for palm oil plantation. Habitat ecological structure loss: Ecologically and structurally oil palm plantations are much less diverse than forests and natural vegetation ecosystems. Species diversity therefore declines significantly once forests and natural vegetation ecosystems are converted to oil palm. Planting of palm oil plantations will lead to loss of the ecological niches (provided by natural ecosystems) which are important for their survival. The palm oil plantation will lead to loss of feeding habitat, reproduction and hiding niches for fauna (herpetofauna, insects, butterflies, dragon flies, reptiles, amphibians, small and large mammals. As a result, there will be a reduction in on-site fauna diversity and abundance, since they are susceptible to disturbances and land use changes.

Pollution from agricultural chemicals: Run-off of agricultural fertilizers, pesticides and other chemicals may affect amphibians with freshwater-based larvae developmental stages / phases. Mahaney (1994) found that chemical contamination inhibited tadpole growth and prevented metamorphosis. The chemicals may contaminate food sources, displace species to different areas where conditions are habitable. Impact on the amphibian metamorphosis will in turn affect predators that feed on them. In addition, vegetation clearance will expose soil, causing runoff especially during rainy season, which will result in soil erosion and sediment loading in water sources / wetlands in project areas. This may affect breeding habitats for the herpetofauna.

Disturbances can manifest in the following ways;

- Habitat destruction through vegetation clearing and its associated adverse impacts like loss of suitable foraging, roosting and breeding habitat for insects.
- Habitat alteration may lead to reduction in species richness resulting from unfavourable habitat with low food availability and shelter.
- Watercourses such as rivers, streams, wetlands and other types of flowing water are some of the suitable habitats for Odonates (dragonflies and damselflies). Changes in aquatic plant communities, such as plant removal or draining wetlands may reduce the quality of odonate habitat. Soil erosion due to heavy vehicular traffic and excavation could lead to draining of wetlands and contamination from use of pesticides, herbicides and fertilizers thus reducing the quality of aquatic mammal habitats.
- During weeding many invertebrates may be killed. Weeding removes the cover for wildlife such as amphibians, snakes and small mammals exposing them to predators such as owls.

- Many insects and insect pests may flourish in Oil Palm plantation due to absence of natural enemies.
- The use of agrochemicals may have a significant negative impact on the population of insect pollinators which will adversely affect crop production in the areas near oil palm plantation.

Overall, vegetation clearance and habitat change will lead to loss of life, direct harm and injury and displacement of biodiversity species that have been ranging on farmland, bushland, forest patches and grazing lands.

Mitigation measures

- The critical habitats for mammals are mainly forest reserves, permanent and seasonally flooded wetlands; these should be protected so that the area retains its ecological integrity. No palm oil growing activities should be earmarked for these areas.
- Open grassland areas are highly recommended for palm oil growing since in the long term will be replaced with Palm forests, this in the long term will compensate for vegetation losses and carbon sinks.
- All developments should observe the 200m buffer distance stipulated by NEMA under the National Environment Act Cap 153 for works along water courses especially the Lake and wetland areas.
- Use of cover plants as used by Kalangala Palm oil growers' association. The cover plant helps with stabilizing the soils to control erosion.
- Use only the recommended amount of fertilizer on the plant and also apply fertilizers during appropriate times of the year and avoid applying fertilizers near water sources such as ponds, wells, waterways and Lakes.

8.2.19 Biodiversity conflicts

Direct harm and injury and displacement of biodiversity species may generate conflicts with people in the landscape, resulting into conflict-killings. E.g. displacement of lizards, and snakes may result into herpetofauna groups / types venturing into people's gardens and homes, which may result into their killings.

Mitigation measures

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8.2.20 Water pollution and threat of eutrophication

The regular use of fertilisers and sometimes herbicides in the management of palm oil plantations increases nutrient loading and pollutants into the ecosystem. When nutrients like nitrogen and phosphorus are washed down by storm water into water bodies, both above and below ground, it leads to changes in the growth rate, species composition and relative abundance of aquatic plants/planktons. Both phytoplankton and zooplankton are an important food source for aquatic organisms for example fish. However, higher quantities of nutrients beyond optimal levels (eutrophication) may cause algal blooms and alter the dominance of algae from the palatable diatoms and green algae to invasive blue green algae which is not only indigestible but also toxic to fish (Hecky *et al.*, 2010). Furthermore, changes in the diversity of plankton species may indicate pollution of the aquatic ecosystem (Walsh, 1978; Hosmani, 2014) and will also affect the benthic macro-invertebrates and fish which depend on them. Henceforth, species composition and relative abundance of aquatic biodiversity which comprise of; phytoplankton, zooplankton, benthic macro-invertebrates and fish, are used as natural bio indicators in monitoring the environmental health (Parmar *et al.*, 2016).

During ESIA, a total of 4 fish species belonging to 3 families were recorded in the sampled aquatic ecosystems. Bulingo Landing Site recorded the highest (3) number of species while Churwe R. and Katindo R. recorded only one each. All the fish species recorded in the project area were not of serious ecological concern according to the IUCN red list 2021-3. Implying that as regards fish biota in the area, there is no such fear that the project activities will cause critical damage to the species if handled carefully.

Mitigation measures

- Monitoring is proposed as this will help to provide early warning indicators of the impacts of the project activities and can help to ensure continued provision of fish as a source of food and income.
- The communities should be sensitized on proper usage of fertilizers that is, type and quantity and methods of application and probably timing to minimize their wash down into the underground aquifer and downstream water bodies and wetlands.
- At the different farms, a properly constructed and planned storage facility should be in place for storage of the agro-inputs.
- The 200 m buffer zone rule should be observed and enforcement should be strict on the issue of its observance in order to reduce chances of silt and contaminants reaching the surface waters.
- Recycling of palm oil empty fruit bunches as fertilizer in the plantation which could reduce the use of mineral fertilizers and improve water quality
- Guideline on safe handling of agrochemicals and appropriate personal protective equipment should be provided.
- Application of best management practices aimed at promoting sustainability such as integrated control of pests and diseases
- Arrangements for the proper disposal of the agrochemical empty containers, as well as storage of fertilizers and pesticides

8.2.21 Increased gaseous emission of particulate matter

Project implementation will result in dust generation as a result of construction of access roads, increase in traffic, land preparation construction and operation of mill. Dust will also be

generated during the transportation of required construction materials, raw materials for the project such as seedlings, fertilizers, pesticides and ready palm oil and crude palm oil for processing.

The gaseous emissions caused by project equipment, are expected to include NO, VOC, CO, NO₂, SO₂, including volatile organic compounds since most of the construction equipment and machinery will be powered by diesel engines. Furthermore, the emissions will contribute to reduction in oxygen levels within the project area.

Fumes from vehicle exhausts are products of combustion of fuel in an engine. Transportation of construction materials, project raw materials and fresh fruit from small holder farms involve use of various automobiles which emit fumes and other by products of partial combustion such as carbon monoxide. Thereby compromising air quality in the project area.

During mobilisation of equipment and personnel, emissions from vehicles will be transient, intermittent and spatially variable, therefore it is expected only a small incremental increase in combustion-based air pollutants will be generated.

Impact will occur from the vehicles and machinery that will be utilized during the project implementation and given that the baseline air quality in the project area is considered to be in a good condition, the impact will be temporary, localised and reversible, though emissions will directly be impacting the workers, small holder farmers and biodiversity traits within the project area.

Dust will be generated during project implementation activities and it may have the following negative impacts:

- Affect respiratory health of workers and potentially local community members;
- Temporarily hinder visibility for workers and local communities;

Project activities including clearing land for establishment of palm plantations, clearing land for the Oil Mill and its components including effluent treatment ponds, back and forth movement of project vehicles and transportation of palm fresh fruits will result in dust generation. In addition, construction of access roads within the plantations, increase in traffic, land preparation construction and operation of mill will also increase dust in the area. Dust will also be generated during the transportation of required construction materials, raw materials for the project such as seedlings, fertilizers, pesticides and ready palm oil and crude palm oil for processing.

Dust will directly impact the workers, small holder farmers, existing biodiversity traits and the entire community in the area.

Mitigation Measures

- Exhaust emissions from vehicles operating within the site, including trucks, excavators, diesel generators or other equipment, will be controlled by the contractor by ensuring that emissions are minimized through regular servicing of machinery to meet the relevant emission standards.
- Ensure that the engines of all vehicles and machinery on site are not left running unnecessarily.
- Equipment to be used in the project to comply with recognized performance design standards.
- All emission-producing equipment will be operated only when necessary and unnecessary idling of equipment will be avoided.
- Conduct regular monitoring of air quality of the environment.
- Adopt an appropriate dust suppression method such as wetting of access roads at

adequate frequency based on a risk assessment.

- All materials truck loads that access the Oil Mill site will be covered.
- Stockpiles of construction materials and other raw materials should be shielded from wind using tarpaulin every time they are to access the project area.
- A speed limit of 40 km/h for light vehicles and 30 km/h for heavy vehicles should be maintained on route used to access the site especially during the dry season and during windy conditions.
- Minimize accumulation of loose soils encountered during land preparation.

8.2.22 Pressure on infrastructure as a result of influx of people

There will be an increased influx of people due to increased employment opportunities thus, increasing the population density with subsequent pressure on socio-economic infrastructure in the area and increase in human waste and domestic waste. The issue of sanitary facilities may escalate the issue of nutrient loading into the water column along which stimulate harmful algae blooms and eventually threaten the wild fish species as well as the human health. While the pressure on social facilities may lead to shortage of water and electricity/shutdowns.

Mitigation measures

- Communities should be sensitized on proper channelling of domestic wastes avoidance of human open defecation and watering of animals within water sources.
- The project should plan to construct enough toilet facilities within the project areas since the population is likely to increase in response to the project thus water contamination may increase as well.
- Dumping of garbage or domestic wastes should be properly planned to avoid water contamination.
- In order to minimize the negative social behaviour, it is recommended that, where necessary and feasible, local labour force from within the immediate communities be recruited to minimize housing pressures as well as social conflicts in the project area.

8.2.23 Impacts to archaeological and cultural sites

As noted, a total of 3 sites of cultural significance were recorded in the project area and all sites are located within the proposed area for development and could be directly affected during the project implementation phase. Heavy impact is expected on culturally sensitive trees especially those encircling sacred sites/forests/plants. Archaeological resources that tend to occur underground are also expected to be encountered during site clearing. Heritage sites are commonly fixed features in the environment, any impact on them has a potential to cause a permanent or irreversible state. Heritage resources also lose meaning as a result of development impacts. There might be through;

- Damage of archaeological sites; agriculture, cultivation and removal of top soil has a great potential of damaging of archaeological artefacts that occur below the surface.
- Loss of local herbs/ medicinal plants to create land for oil palm plantation. Traditional herbal medicine is a key element among the local communities in Kalungu.
- Possible looting of cultural heritage resources for example trees.
- Lack of privacy to sacred sites, shrines as trees encircling these sites are at a risk of being cut down to pave way for oil palm plantation.
- Loss of provenance of archaeological objects/interchange of the landscape hence losing meaning of object/artefacts.
- Backcloth trees (*locally known as Mutuba*) are at a risk of being cut down. Backcloth making is already an endangered activity that need to be preserved and protected.
- Cutting down of culturally and historical sensitive trees and forests.

- Construction of access roads, camp sites and oil palm mill will have a great impact on archaeological resources since they involve excavation

Mitigation measures

- All trees with cultural or historical value that fall within the project boundary should be preserved.
- A management plan which includes mitigation measures should be developed to help minimize project impacts on cultural heritage resources.
- All sacred/historical/cultural trees or forests, hills, caves and rock outcrops should be avoided.
- Mapping and avoidance of all already known archaeological and cultural heritage sites.
- Community members should be empowered to preserve cultural resources and practices alongside development for future generations.
- Cultural heritage sites should be preserved and promoted for cultural tourism and research.
- Avoid all patches bare of vegetation unless previously inspected by an archaeologist. These might be old settlement sites.
- Formulation of a chance finds procedure especially for archaeological materials that might be encountered during pit digging for oil palm plants.

8.2.24 Occupational hazards from crop management

Anticipated occupational hazards during crop management and at different locations include accidents like snake bites and slip and fall during pruning and harvesting, fall from moving trailers/truck or car, injuring body parts while working, fall from heavy equipment, parts of the body affected by toxins, ingestion of toxins, parts of the body being exposed to equipment's/machinery in the workshops, body blisters in the workshop and plantations, electric shocks, pricks from palm thorns. Pesticides, including herbicides, commonly used in oil palm plantations have adverse impacts on human beings and the environment.

Mitigations measures

- Officials from DOSH should undertake annual inspections.
- Develop and follow a Health and Safety policy during project operations/implementation.
- Warning and safety signage for example "Think safety first", "No smoking", warnings; "High voltage electricity" should be displayed within the plantation's premises on noticeboards and walls to remind workers of health and safety concerns.
- First aid boxes should be in place.
- Heavy equipment and machinery should be lifted and transported using trolleys and fork lifts.
- Smallholder farmers should be sensitized to avoid risk work areas and to keep distance between themselves in risky areas.
- Only authorized personnel should be allowed in the chemical storage rooms.
- Provide and enforce usage of PPE and appropriate wear.

8.2.25 Noise nuisance

The impact magnitude of noise during the subsequent project implementation phases is considered to be Medium given the activities of construction of access roads, increase in traffic, land preparation, construction and operation of plantations are phased in occurrence thus the impact will be temporary, localised and reversible.

Mitigations measures

- Use of equipment in good working condition
- Use of muffles / dampeners on equipment to make it quieter and more difficult to hear especially on the generator
- Ensure to replace noisy equipment with quieter one whenever assessment indicates so.
- For activities where noise levels are measured to be over 60dB(A), limit working hours to day time.
- Provide hearing protection devices to employees working with equipment producing 85dB(A) and above continuously for more than 8 consecutive hours.
- Procure hearing devices from professional suppliers
- Regularly monitoring of noise levels to regulate activities when levels exceed permissible limits.
- Put in place signage to remind workers about use of PPE.
- Undertake regular noise measurements and submit the reports to NEMA for guidance.

8.2.26 Loss of fertility due to excess application of fertilizers and pesticides

During Palm Oil growing, application of fertilizers and pesticides is inevitable to ensure proper growth. Excess use of fertilizers disintegrates the soil structure, killing soil microorganisms thus infertility.

Mitigation measures

- Develop a fertilizer application programme based on results from soil analysis with assistance from NARI/NARO for the immature period.
- Undertake foliar analysis to guide an annual fertilizer programme for the mature period of oil palm trees
- Fertilizer use shall be carefully regulated to minimise costs and negative impacts on the environment

8.3 Cumulative impacts

All environmental and social assessments of IFAD-supported projects must consider: (i) other current and proposed development activities within the project area; (ii) spontaneous activities that could be spurred by a project. For the proposed project area in Kalungu District, impacts from existing projects have to be considered as well as the NOPP at full scale.

- Pollution from oil palm fertilizers, pesticides and other chemicals will result in cumulative impacts on biodiversity, water and soil sources, project workers and the local community.
- As more small holder farmers clear land for palm oil growing, more fauna species will be displaced, injured or killed.
- The threat of food shortage is also likely to be cumulative as more and more farmers will engage in palm oil planting, leading to food insecurity.
- Socio-economic impacts from influx of people in the area arising from many projects operating in the area.

Mitigation measures

Measure to the above discussed impacts have been provided in sections 8.2.3, 8.2.6, 8.2.8.

8.4 Decommissioning impacts

8.4.1 Occupational hazards

Occupational hazards during decommissioning include accidents like snake bites and slip and fall during clearing, fall from moving trailers/truck or car, injuring body parts while working, fall from heavy equipment, parts of the body affected by toxins, ingestion of toxins, parts of the body being exposed to equipment/machinery in the workshops, body blisters from workshop and plantations equipment, pricks from palm thorns. Pesticides, including herbicides, commonly used in oil palm plantations have adverse impacts on human beings through ingestion of toxins and toxins leaking and affecting body parts.

Mitigation measures

- Communities and school children should be sensitized on the road safety and need to keep away from plantations under decommissioning;
- Workers will be instructed to observe speed limits and general order while driving across sections of schools and trading centers;
- There will be erected speed control humps across sections of roads near the schools.
- Staff/farmers should be specifically trained to mix chemicals before applying them in the oil plantations.
- Farmers should be advised to obtain PPE such as goggles, gloves, aprons, nose masks, gumboots to be used while spraying and applying fertilizers, and they should be replaced in a timely manner.
- Chisels and sickles should be designed with cloth covers to avoid getting scars in hands.
- A medical facility should be put in place.
- Workers and farmers should be trained in OSH and accident prevention regularly.
- There should be first aiders.

8.4.2 Loss of carbon sink

As noted above, palm oil plantations act as carbon sinks in formally degraded areas, hence the decommissioning phase will lead to loss of carbon sink that the plantations were providing hence climate change in the project areas and this impact will be medium negative.

Mitigation measures

- Work with local communities to set up woodlots
- Encourage oil palm plantation owners to reserve trees on farm.
- Projects to promote agroforestry programmes within Kalungu District should be undertaken in collaboration with stakeholders such as Agroforestry Initiative Uganda.
- Undertake phased plantations decommissioning as woodlots programs get introduced/encouraged in the area.
- A decommissioning and restoration plan should be developed by MAAIF to guide farmers at the end of the project life span.

8.4.3 Soil erosion and water pollution

Large scale clearing of plantations will likely leave the land bare hence leading to soil erosion and thus loss of soil fertility. This will also lead to pollution of water sources especially if fertilizers/pesticides were applied unsustainably prior to the decommissioning phase.

Mitigation measures

- Undertake phased plantations clearing leaving the cover crops in place.
- During plantations establishment the 200m and 50m buffer zones from Lake Victoria and wetlands respectively should be observed.
- Plantation decommissioning should be planned to be undertaken during the dry season to minimize cases of soil runoff.

8.4.4 Poor waste management

Waste during decommissioning shall be spoil waste from land clearing, packaging materials, domestic and sanitary waste which if handled poorly shall end up affecting area water and soil sources and area aesthetics. These need to be adequately handled to minimize significance of the impact.

Mitigation measures

- Spoil material should not be put near water points and measures to prevent it running with storm water should be put in place.
- Identify dumping sites for the spoil materials, these should not be in wetlands.
- Waste should be segregated and adequately disposed of.
- Hazardous waste should be handled by a licensed handler.
- Sanitary facilities shall also be put in place at the different plantations.

8.4.5 Loss of income for palm oil farmers and other employees

Though some people will be employed during clearing of the plantations, many will lose jobs since many people shall be employed during the operation and maintenance of plantations. This impact is of high socio-economic value and high magnitude thus a large negative significance.

Mitigation measures

- Undertake phased plantations decommissioning.
- Encourage large scale agriculture in the project area.

8.4.6 Impacts to soils and to crop farming

Prolonged use of some pesticides and artificial fertilizers might change the state of soils, such that any planned change by farmers to shift back to growing other crops might be negatively affected if soils can no longer support crops they used to grow before engaging in palm oil plantations. Harvested crops might also contain high properties that were intended for palm oil fruits only thus posing risk to those that shall consume them.

This impact is anticipated to be small negative or negligible since most crops can easily be intercropped within palm oil plantations.

Mitigation measures

- Advise and sensitize farmers to allow land to fallow for a certain period of time say 2 months before planting of other crops especially food crops.
- Extension workers should guide farmers on crops suitable to be grown in such soils.

Table 8—2: Summary of the results of impact assessment of the project

Impact	Environment/Socio-economic aspect	Project component/actual activity	Degree value/vulnerability of environmental component	Magnitude of impacts	Overall impact Significance (without mitigation measures)
			Low/Medi/High ----- -----	Negative Positive High Medium Little/No Med. High ----- ----- -----	
Positive impacts during project implementation					
Employment opportunities	Local community and other nationals	Growing palm oil	-♦-	-♦-	Large Positive (+++)
Improved income	Local community	Growing palm oil	-♦-	-♦-	Medium Positive (++)
Improved Infrastructure	Local community	All project components	-♦-	-♦-	Medium Positive (++)
Widened revenue base	From increased palm oil production From local palm oil plantation farmers Indirect consumers	All project components	-♦-	-♦-	Large positive (+++)
Skills development	Local Community and other nationals	Palm oil plantations (farming techniques)	-♦-	-♦-	Small positive (+)
Land restoration of previously unproductive areas	Farmlands, bush lands within the project area	All project components	-♦-	-♦-	Medium Positive (++)

Impact	Environment/Socio-economic aspect	Project component/actual activity	Degree value/vulnerability of environmental component	Magnitude of impacts	Overall impact Significance (without mitigation measures)
			Low/Medi/High ----- -----	Negative Positive High Medium Little/No Med. High ----- ----- -----	
Prevention of loss of soil fertility through intercropping	Farmlands	Palm Oil plantations	-♦-	-♦-	MediumPositive (+)
Increase in biomass due to increase in vegetation cover	Biofuel	Palm oil plantations	-♦-	-♦-	Medium Positive (++)
Climate regulation	Climate change	Palm Oil plantations	-♦-	-♦-	Medium Positive (++)
Recovery of archaeological materials	Physical cultural resources	Project activities that involve ground disturbance	-♦-	-♦-	Large positive (+++)
Exposure to archaeological and cultural resources	Physical cultural resources	Vegetation clearance, ground disturbance	-♦-	-♦-	Large positive (+++)
Negative impacts from site clearance, preparation, and palm oil planting					
Change in Land use	Bugonzi village Seif Ssekasamba 376612, 9979711 376598, 9979710 376584, 9979772 376705, 9979747 Farmland dominated by coffee, passion	Palm Oil Plantations	-♦-	-♦-	Medium Negative (--)

Impact	Environment/Socio-economic aspect	Project component/actual activity	Degree value/vulnerability of environmental component	Magnitude of impacts	Overall impact Significance (without mitigation measures)
			Low/Medi/High ----- -----	Negative Positive High Medium Little/No Med. High ----- ----- ----- -----	
	fruit sheds and farm paddocks Bugonzi village Kawuki Badru 376020, 9979432 375958, 9979426 375974, 9979485 376023, 9979519				
Conflicts between workers and community	Economic insecurities	Criteria of choosing smallholder farmers, recruitment of workers on other project components	-♦-	-♦-	Medium Negative (--)
Nutritional Disorders	Quality and availability of food crops	Palm Oil plantations	-♦-	-♦-	Minimum/no (0)
Dependency on the Nucleus Farm	Farmlands	Palm Oil plantations	-♦-	-♦-	Medium Negative (--)
Labour Issues	Local community	All project componets	-♦-	-♦-	Medium Negative (--)
Disruption of current sources of livelihoods	Local community, livelihoods	Palm Oil plantations	-♦-	-♦-	Medium Negative (--)

Impact	Environment/Socio-economic aspect	Project component/actual activity	Degree value/vulnerability of environmental component	Magnitude of impacts	Overall impact Significance (without mitigation measures)
			Low/Medi/High ----- -----	Negative Positive High Medium Little/No Med. High ----- ----- ----- -----	
Increase in HIV and other STIs	Local community	Interaction of project workers with the community	-◆-	-◆-	Large Negative (---)
Accidents and injuries attributed to project implementation process	Local community	Timely transportation of seedlings for planting, fertilizers, pesticides and harvested oil palm,	-◆-	-◆-	Large negative (---)
Influx of people from migrant workers	Local community Pressures on utilities	Interaction of project workers with the community,	-◆-	-◆-	Medium Negative (--)
Vulnerability as a result of gender related issues	Gender equality	Recruitment of smallholder farmers	-◆-	-◆-	Medium Negative (--)
Shift in crop type growing	Food security	Palm Oil plantation	-◆-	-◆-	Large Negative (---)
Loss of invertebrate fauna as a result of weeding	Fauna	Palm Oil plantation	-◆-	-◆-	Medium Negative (--)
Occupational hazards during crop management	Workers, smallholder farmers	Palm Oil plantation	-◆-	-◆-	Medium negative (--)

Impact	Environment/Socio-economic aspect	Project component/actual activity	Degree value/vulnerability of environmental component	Magnitude of impacts	Overall impact Significance (without mitigation measures)
			Low/Medi/High ----- -----	Negative Positive High Medium Little/No Med. High ----- ----- ----- -----	
Contributes to climate change through carbon sequestration	Climate change	Palm Oil plantation	-♦-	-♦-	Large Negative (---)
Plant species diversity decline	Floral diversity	Palm Oil plantation	-♦-	-♦-	Medium Negative (--)
Decline in natural habitats mostly forest, and wetland areas	Nabukonge forest reserve Eucalyptus spp woodlot in pure stands, with few mosaics and fragments of a secondary natural forest seating on Narozari catholic church land The natural forest species recorded included, Pycnanthus angolensis, Maesopsis eminii, Sapium ellipticum, Blighia unijugate, Entandrophragma angolense, Cordia	Land preparation, palm oil plantation	-♦-	-♦-	Medium Negative (--)

Impact	Environment/Socio-economic aspect	Project component/actual activity	Degree value/vulnerability of environmental component	Magnitude of impacts	Overall impact Significance (without mitigation measures)
			Low/Medi/High ----- -----	Negative Positive High Medium Little/No Med. High ----- ----- ----- -----	
	<p>africana, Sesbania sesban, Cajanus cajan, Dalbergia melanoxylon, Smilax anceps, Maesa lanceolata, Antiaris toxicaria and Spathodea campanulata Saplings of Markhamia lutea were evident in the Eucalypts sites</p> <p>Forest boundaries 363588, 9951526 363510, 9951374 364426, 9952359; 364422, 9952313; 364083, 9952142</p>				
Decreased availability of forest products	Nabukonge forest reserve Eucalyptus spp woodlot in pure stands, with few mosaics and fragments of a secondary natural	Palm Oil plantation	-♦-	-♦-	Medium Negative (--)

Impact	Environment/Socio-economic aspect	Project component/actual activity	Degree value/vulnerability of environmental component	Magnitude of impacts	Overall impact Significance (without mitigation measures)
			Low/Medi/High ----- -----	Negative Positive High Medium Little/No Med. High ----- ----- ----- -----	
	<p>forest seating on Narozari catholic church land</p> <p>The natural forest species recorded included,</p> <p>Pycnanthus angolensis,</p> <p>Maesopsis eminii,</p> <p>Sapium ellipticum,</p> <p>Blighia unijugate,</p> <p>Entandrophragma angolense,</p> <p>Cordia africana,</p> <p>Sesbania sesban,</p> <p>Cajanus cajan,</p> <p>Dalbergia melanoxylon,</p> <p>Smilax anceps,</p> <p>Maesa lanceolata,</p> <p>Antiaris toxicaria and</p> <p>Spathodea campanulata</p> <p>Saplings of Markhamia lutea were evident in the Eucalypts sites</p> <p>Forest boundaries</p>				

Impact	Environment/Socio-economic aspect	Project component/actual activity	Degree value/vulnerability of environmental component	Magnitude of impacts	Overall impact Significance (without mitigation measures)
			Low/Medi/High ----- -----	Negative Positive High Medium Little/No Med. High ----- ----- ----- -----	
	363588, 9951526 363510, 9951374 364426, 9952359; 364422, 9952313; 364083, 9952142				
Decline of energy resources/ increase in charcoal burning practices	Biofuel	Palm Oil plantation	-♦-	-♦-	Medium Negative (--)
Soil erosion	Soil, Local community	Palm Oil plantation	-♦-	-♦-	Medium Negative (--)
Proliferation of invasive species	Floral diversity, farmlands, bushlands	Palm Oil plantation, Movement of workers, smallholder farmers from one area to another	-♦-	-♦-	Medium Negative (--)
Damage of archaeological sites	Physical cultural resources	Palm Oil plantation	-♦-	-♦-	Medium negative (--)
Loss of archaeological objects		Land preparation	-♦-	-♦-	Medium negative (--)

Impact	Environment/Socio-economic aspect	Project component/actual activity	Degree value/vulnerability of environmental component	Magnitude of impacts	Overall impact Significance (without mitigation measures)
			Low/Medi/High ----- -----	Negative Positive High Medium Little/No Med. High ----- ----- -----	
Cutting down of cultural and historical sensitive trees and forests		Vegetaion clearance	-◆-	-◆-	Medium negative (--)
Operation and Maintenance (O&M)					
Water pollution and eutrophication	Water sources	Application of fertilizers	-◆-	-◆-	Medium Negative (--)
Increase in emission of particulate matter	Air quality	Dust will also be generated during the transportation of required raw materials for the project such as seedlings, fertilizers, pesticides and ready palm oil and crude palm oil for processing.	-◆-	-◆-	Medium Negative (--)
Emission of fumes from project equipment and automobiles	Air quality	Operation of equipment and machinery vehicles will produce emissions, which could impact on the ambient air quality.	-◆-	-◆-	Medium Negative (--)
Noise nuisance to the community	Noise	Use of mechanized equipment on Plam Oil farms	-◆-	-◆-	Medium Negative (--)

Impact	Environment/Socio-economic aspect	Project component/actual activity	Degree value/vulnerability of environmental component	Magnitude of impacts	Overall impact Significance (without mitigation measures)
			Low/Medi/High ----- -----	Negative Positive High Medium Little/No Med. High ----- ----- ----- -----	
Loss of fertility due to excess application of fertilizers and pesticides		Excess use of fertilizers and pesticides disintegrates the soil structure, killing soil microorganisms thus infertility	---◆---	---◆---	Large Negative (---)

9 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The ESIA process has identified the key environmental and social issues, impacts and risks associated with the project requiring the implementation of a wide range of mitigation measures. The necessary actions required to manage these issues, impacts and risks are presented in this Environmental and Social Management Plan (ESMP); these include identification of all project commitments, mitigation measures that have been identified from the impact assessment, and other best practice measures designed to avoid, minimise or reduce negative impacts and enhance positive impacts. The objectives of the ESMP are to:

- Identify the set of responses to potentially adverse impacts;
- Define the responsibilities for implementation and monitoring;
- Determine requirements for ensuring that mitigation and management measures are implemented effectively and in a timely manner; and
- Describe the means for meeting those requirements.

The purpose of this Chapter is to demonstrate how the mitigation commitments made through the impact assessment process will be put into practice, monitored and upheld. The content of this chapter is crucial to bridge the findings of the impact assessment with the implementation of the mitigation measures and to provide an early framework of management systems / monitoring regimes that will help to deliver these commitments. The ESMP is a living document which:

- Incorporates the environment and social mitigation measures identified as a result of the ESIA into a comprehensive framework to facilitate and ensure appropriate management throughout the project cycle;
- Outlines the required regulatory monitoring
- Provides a framework to incorporate commitments into the Project plans and procedures for activities that have risks, as identified in the ESIA;
- Presents responsibilities for meeting ESMP requirements including the provision of training;
- Provides a framework for the implementation of specific management plans by the project proponent; and
- Defines the monitoring/verification and reporting program (including corrective actions).

9.4 Responsibility for implementing the ESMP

The key parties and their primary roles in implementing the ESMP are as follows:

- Project proponent is responsible for the overall project monitoring, ensuring compliance with environmental policy and obligations in the ESMP;
- Other operational contractors – responsible for complying with the ESMP requirements

The ESIA team has provided guidance on the types of roles and responsibilities that would be required for implementation of the ESMP throughout project life cycle.

9.4.1 Project Manager

The Project Manager is responsible for all project implementation activities and accountable for overall ESHS (Environmental, Social, Health, and Safety performance) of the project. Expectations for the role in terms of implementing a management system would include:

- Actively promoting and participating in the project ESHS Plan;
- Ensuring that the ESHS Management Plan, procedures and work practices are implemented across the project;
- Ensuring that the ESHS Plan reflects the requirements of the project in terms of resources and budget;
- Ensuring that all legislative and project requirements are complied with;
- Ensuring that all work scopes are conducted in accordance with the project ESHS rules and regulations, work practices and procedures, as detailed in this ESMP and other associated documentation;
- Ensuring that all contractors are made aware of their roles and responsibilities with regard to ESHS management;
- Ensuring that ESHS is regularly discussed and reported on i.e., in the weekly contractor progress meeting
- Ensuring that all contractors are evaluated throughout the duration of the project, as to their capabilities and performance; and
- Ensuring implementation of ESHS audit recommendations for non-compliances

9.4.2 EHS Department

The Health, Safety and Environmental (EHS) Department would be expected to undertake the following roles:

- Manage, review and develop the EHS program to ensure that it fulfils project's requirements, including measures observed in this ESMP, and monitor the implementation including e.g., patrolling the job site daily to ensure construction and operation works' compliance to project EHS procedure and safe working practices;
- Coordinate and evaluate the effectiveness of all program elements;
- Liaison with related government bodies as necessary;
- Manage the project's EHS team and supervise them to ensure that all areas of the project are given the required level of safety support and attention;
- Ensure proper housekeeping and waste disposal in accordance with project requirements and regulations;
- Ensure that the respective control areas are given in the required level of safety support and attention including e.g., only safety-approved material and equipment are allowed to be brought onto site;

- Ensure that all EHS reports/findings of any unsafe conditions/practices is brought to the attention of field management and those are immediately corrected, and coordinate accident/incident investigations and report to Project Manager; and
- Manage EHS Audits and report the results to the Project Manager.

9.4.3 Community Relations Department

The Community Relations Department would be expected to undertake the following roles:

- Manage, review and develop the Social Program to ensure that it fulfils project's requirements, including measures observed in this ESMP, and monitor the implementation;
- Coordinate and evaluate the effectiveness of all program elements;
- Manage the implementation of stakeholder relations and grievance management to ensure that all social-related requirements in this ESMP are implemented;
- Manage the implementation of community health program, including coordination with EHS team on OSH measures associated with management of impact to community health;
- Coordinating with EHS team on implementation of the project vehicle safety measures associated with management of impact to community safety;
- Coordinating with HR (Human Resources) person to ensure implementation of labour-related measures required in this ESMP;
- Consultation with community and liaison with relevant stakeholders in implementing the required stakeholder and grievance management measures, including liaison with related government bodies as necessary;
- Leading collaboration to establish and implement the Project grievance mechanism during construction phase, and supervise contractor's social performance as required in this ESMP; and
- Managing social monitoring and reporting the results to the Project Manager.

9.4.4 Contractor

The contractors, depending on their work scopes, would be expected to have an EHS team. The contractors' site representatives or EHS Department should be assigned clear responsibilities and expectations with respect to implementing the project's ESHS expectations and should be fully responsible for implementing any required expectations which fall under their work scopes. More specifically, they will:

- Actively promote and implement all project EHS plans related with the work they are performing. The contractor will make sure that all activities under his/her responsibility shall follow all safety regulation/requirements
- Ensure that committed resources (personnel, material, and equipment) used are consistent with achieving the objectives and requirements of the project ESHS Plan.

9.4.5 Any other personnel involved in the project (Smallholder farmers and Employees)

Any other personnel say, employees, smallholder farmers shall be obligated to:

- Familiarise themselves with the concept of the project ESHS rules and regulations;
- Work in accordance with project ESHS procedure, safe work practices, and method statements, risk assessments, permits to work and any other instructions that apply to their works;

- Use only tools/equipment and materials, which have been approved for use, and employ them only for the purpose for which they were designed;
- Take an active part in the protection of themselves, fellow workers/smaller holder farmers, property and the environment from accidental losses;
- Immediately report to respective supervisor or EHS officer/inspector if any potential hazards (relates to unsafe conditions and/or unsafe acts), which could lead to an accident, are found;
- Report promptly to immediate supervisor and EHS officer/inspector if any incidents/near misses as well as injuries, regardless how minor; and
- Shall attend project safety training and drills programs as required.

9.5 Reporting and Documentation

Project proponent shall develop and implement a programme of regular reporting through the stages of the project lifecycle. The personnel delegated EHS roles shall be required to fully comply with the monitoring programme in terms of timely submissions of reports as per acceptable level of detail. Reporting will be done in form of environmental check list, incident record register, training records, and environmental and social performance reports (e.g., weekly, monthly, quarterly, half yearly and yearly).

9.5.1 External Reporting and Communication

The personnel delegated EHS roles shall be responsible for ensuring that the communication with the regulatory agencies and stakeholders is maintained as per the requirement. All complaints and enquiries are to be appropriately dealt with and records be maintained.

9.5.2 Internal Reporting and Communication

Internally, the personnel delegated EHS roles will share inspection and audit findings with their suggested measures regularly to the senior management for their consideration. The same are also to be communicated within the staff working on the project. To maintain an open communication between the staff and management on EHS and social issues the followings are being used:

- Team Briefings,
- On-site work group meetings; and
- Work Specific Instructions.
- Documentation

Documentation is an important step in the implementation of the ESMP. The project proponent will establish a documentation and record keeping system in keeping with their ESMS, to ensure recording and updating of documents as discussed in the ESMP. Responsibilities have to be assigned to relevant personnel for ensuring that the ESMP documentation system is maintained and that document control is ensured through access by and distribution to, identified personnel in form of the following:

- Environmental and Social Management System (ESMS) document;
- Legal Register;
- Operation control procedures;
- Work instructions;
- Incident reports;
- Emergency preparedness and response procedures;
- Training records;

- Monitoring reports;
- Auditing reports; and
- Complaints register and issues attended/closed.

9.6 ESMP Review and Amendments

The ESMP acts as an environment and social management tool which needs to be periodically reviewed to address changes in the organization, process or regulatory requirements. Following a review, project in charge in coordination with personnel delegated EHS will be responsible for making the amendments in the ESMP and seeking approval from the Regional and Corporate heads. The amended ESMP will be communicated to all the staff on the project.

9.7 Training, Awareness and Competency

The Project is required to implement a training and awareness program covering ESHS expectations of the Project. As a minimum, this should be implemented as an induction for all employees and contractors engaged on the project construction, with further training to be implemented depending on the level of responsibility for implementing EHS and social expectations and exposure to environmental and safety risks. The Project should ensure that all personnel responsible for the implementation of this ESMP are competent on the basis of education, training and experience. All personnel shall be provided with environmental and social training appropriate to their scope of activity and level of responsibility. The training programme will ensure that all concerned members of the team understand the following aspects:

- Purpose of management plan for the project activities;
- Requirements of the management plan and specific Action Plans;
- Understanding of the sensitive environmental and social features within and surrounding the project areas; and
- Aware of the potential risks from the project activities.

9.8 Monitoring, Review and Audit

A monitoring, review and auditing program will be implemented during construction to monitor implementation of the Projects EHS requirements and environment and social commitments. Ultimately the project proponent would normally be responsible for ensuring that the contractors are complying with the applicable regulatory and Lender EHS and social requirements

9.9 Project Environmental and Social Management Plan

The development of an ESMP is considered to be good management practice for any project or activity with the potential to impact upon the physical, chemical, biological, social and health environment. It provides guidance and a framework for ensuring that the commitments of the project proponent within this ESIA are upheld and that the identified impacts of the project are managed to an acceptable level and in accordance with the requirements of the project ESIA.

Specifically, this ESMP pulls together the mitigation and management measures identified within this ESIA as being necessary for the construction and operational phase of the Project. The mitigation and management measures take place throughout the project lifetime, from pre-construction through construction, operation and decommissioning. In addition, there are common mitigation and monitoring requirements that apply to all phases of the Project, e.g., vehicle use/operation.

The mitigation and monitoring measures specific to the impact assessment conducted for this project ESIA are detailed in Chapter 8. Where specific mitigation measures could not be adequately defined due to lack of project information or uncertainties regarding the environmental or social baseline, recommendations for the development of specific management plans or procedures or follow-up actions have been made.

9.10 ESMP link to other EHS Management System Plans

Other types of plans are required to facilitate practical implementation of the ESMP commitments, for example, Operational Environmental Management Plan, Social Management Plans or specific Safety Plans. These plans or studies are not substituting for the overall ESMP, but serves to describe how the commitments will be implemented in greater detail (and likely at a later stage in Project development) than in the ESMP. This ESMP will be part of the future project activities, and as the future plans are prepared, these are expected to confirm how these commitments will be incorporated into the relevant ESHS management systems. This implementation will be under the responsibility of the project proponent. This ESMP is a live document and will be updated periodically, for example, depending on Project execution and performance.

9.11 Plans, Policies and Procedures

The following plans and follow-up actions were identified as being necessary within this ESHIA to manage identified risks or further understand potential environmental and social impacts (Table 9-1). These plans are intended as framework documents which will be developed by the project proponent under guidance of the consultant to manage specific risks or issues and also align the project with the expectations of the IFC PS and EHS Guidelines.

Table 9—1: Specific Management Plans and Policies

Management Plan	Description
Stakeholder Engagement Plan	<p>A stakeholder engagement plan has been developed, to include:</p> <ul style="list-style-type: none"> • Guidelines and recommendations to conduct future engagement, including consultation with relevant community groups e.g., farmer, local health institution, and • relevant government institution in managing impact from the project activities. This should include planning a workers-community engagement events such as sporting or cultural events to improve understanding and cohesions between non-local workers and the surrounding communities; • Provides a mechanism to manage grievances which can be accessed by all groups of community; and • Recommendation for regular monitoring of stakeholder engagement and grievance resolution.
Social Impact Management Plan	<p>This ESMP identifies the need for the development and implementation of measures to manage issues e.g., impacts from employment and business opportunities, impact to community safety, and community health impact from dust. It is expected that the project proponent under guidance of a consultant will develop more detailed</p>

	<p>planning and implementation of these programs prior to commencement of the project.</p> <p>A plan would need to be developed to ensure the program is appropriate with community needs, also optimize collaboration with local community group or organisation, e.g., to increase the skills of local workers and the capacity of local businesses to meet the needs and requirements of the project.</p>
Occupational Safety and Health (OSH) plan	Some of the mitigation measures that are proposed in this ESMP to manage impact to community health and safety are related to occupational health and safety (OSH) for workers. An OSH plan should be developed to include these measures.
Labour management	<p>A code of conduct or management plan for labour and working condition for all workers both local and non-local involved in the Project, shall be developed in accordance with Uganda regulation, and also to include the following measures to manage impact from non-local workforce presence to community health and social structure:</p> <ul style="list-style-type: none"> • Conduct inductions and regular training refreshers regarding dos and don'ts in relation with interaction with locals; and • Zero tolerance towards inappropriate behaviour from and amongst the workforce with locals.
Solid and water waste management plan	Solid waste and hazardous waste management plans to be developed for the operations phase of the project. These shall confirm the project compliance with Uganda Regulations and IFC PS, EHS, RSPO, IFAD's Guideline expectations on waste management.

Table 9-2 Environmental and Social Management Plan

Project Phase			Potential Impacts	Mitigation Measures	Party Responsible for Mitigation			Monitory Mechanisms /Performance Indicators	Responsible party for monitoring	Budget (USD)
Planning	Construction Establishment	O&M			Contractor/ Company	MAAIF/ NOPP/PMU	DLG			
Positive Impacts										
✓	✓	✓	Employment opportunities	<ul style="list-style-type: none"> Determine numbers of skilled, semi-skilled and unskilled labour requirements for each phase and assess local resource levels through involving local council chairmen, subcounty and district leaders Implement project specific training and community development programs to increase the skills of farmers and workers The Contractors will be obligated to work within Uganda's labour laws (Employment Act), including restrictions on child labour especially where it can interfere with the child's education. 	✓	✓	✓	<ul style="list-style-type: none"> Level of local community awareness of project progress status. Record of contractors' employment activities monthly, including number of jobs created by employment type (skilled / semi-skilled / unskilled); number of jobs by gender, employment type and geographical area; and rate of employee turnover by gender and area. Record of smallholder farmers per subcounty in Kalungu district 	MAAIF Kalungu LG CSO	10,000
	✓	✓	Improved income	<ul style="list-style-type: none"> During the sensitization meetings with local communities, the smallholder farmers need to be 		✓	✓	<ul style="list-style-type: none"> Record of economic pre-assessment valuation of palm oil 	MAAIF Kalungu LG CSO	5,000

Table 9-2 Environmental and Social Management Plan										
Project Phase			Potential Impacts	Mitigation Measures	Party Responsible for Mitigation			Monitory Mechanisms /Performance Indicators	Responsible party for monitoring	Budget (USD)
Planning	Construction Establishment	O&M			Contractor/ Company	MAAIF/ NOPP/PMU	DLG			
				informed about the project likely benefits exhaustively so as they can weigh options for their sources of income.				growing visa vee the current socio-economic activities currently being undertaken in the project area <ul style="list-style-type: none"> Record of community sensitization meeting about the project 		
	✓	✓	Improved Infrastructure	<ul style="list-style-type: none"> Road safety measures should be considered during design of access roads following standard guidelines. Access roads should be in line with ministry guideline general standards for roads under this category. Liaise with district in line with upgrade of access road so as conform with the district infrastructural plans 	✓	✓	✓	<ul style="list-style-type: none"> Road engineering designs Embedded road safety measures in preliminary designs Status of current access roads 	MAAIF Kalungu LG MoW&T	50,000
	✓	✓	Land restoration of previously unproductive areas	<ul style="list-style-type: none"> Identify, demarcate, these unproductive areas in the district that can be utilised for Palm Oil growing 		✓	✓	<ul style="list-style-type: none"> Record of number of identified unproductive area Record of restored unproductive areas 	MAAIF Kalungu LG	7,000
	✓	✓	Prevention of loss of soil fertility through intercropping	<ul style="list-style-type: none"> Creating awareness to smallholder farmers about sustainable farming practices such as intercropping Carryout an assessment to identify the best alternative cover 		✓	✓	<ul style="list-style-type: none"> Record of training awareness program to smallholder farmers Record of assessment reports 	MAAIF Kalungu LG	10,000

Table 9-2 Environmental and Social Management Plan

Project Phase			Potential Impacts	Mitigation Measures	Party Responsible for Mitigation			Monitory Mechanisms /Performance Indicators	Responsible party for monitoring	Budget (USD)
Planning	Construction Establishment	O&M			Contractor/ Company	MAAIF/ NOPP/PMU	DLG			
				crops that can be planted alongside Palm Oil <ul style="list-style-type: none"> Provide the identify cover crops seed to smallholder farmers to encourage them practice intercropping 				aimed at identifying alternative cover crops <ul style="list-style-type: none"> Record of provision of cover crop seeds to smallholder farmers 		
	✓	✓	Increase in biomass	<ul style="list-style-type: none"> Encourage planting of degraded grassland areas Land issues shall be resolved and landowners sensitized about the project, oil palm acreage will increase up to two-fold, averting encroachment on protected forest land and Marshlands/wetland areas Encourage planting of degraded grassland areas 	✓	✓	✓	<ul style="list-style-type: none"> Afforestation programmes Number of plantations established 	NFA MAAIF DWM MWE Kalungu LG CSO Academia	5,500
	✓	✓	Climate regulation	<ul style="list-style-type: none"> Land issues shall be resolved and landowners sensitized about the project, oil palm acreage will increase up to two-fold, thus increasing standing biomass as a carbon sink. 	✓	✓	✓	Number of plantations established	NFA MAAIF DWM MWE Kalungu LG CSO Academia	7,000
	✓	✓	Increase in vegetation cover	<ul style="list-style-type: none"> Promote adoption of oil palm project by the district and NOPP focal person Sensitize the community on the benefits of oil palm growing especially on the micro environment of the area 		✓	✓	Land cover maps (past, current and future) Land cover change maps	NFA MAAIF DWM MWE Kalungu LG CSO Academia	5,500

Table 9-2 Environmental and Social Management Plan

Project Phase			Potential Impacts	Mitigation Measures	Party Responsible for Mitigation			Monitory Mechanisms /Performance Indicators	Responsible party for monitoring	Budget (USD)
Planning	Construction Establishment	O&M			Contractor/ Company	MAAIF/ NOPP/PMU	DLG			
	✓	✓	Recovery of archaeological materials	<ul style="list-style-type: none"> The contractors involved in project implementation especially for the nucleus farm should work hand in hand with professional archaeologist(s) in site selection to help identify and gazette already know archaeological and cultural heritage sites. Also, activities that involve ground movement which is common in agriculture should be monitored and materials salvaged. Local residents should be trained on site protection strategies and handling of valuable artefacts. 		✓	✓		MAAIF MTWA Kalungu LG	
	✓	✓	Exposure to archaeological and cultural resources	<ul style="list-style-type: none"> The communities should be motivated so that they are able to protect, preserve and conserve their own heritage alongside development. 		✓	✓		MAAIF MTWA Kalungu LG	
Negative Impacts										
✓	✓	✓	Displacement of people	<ul style="list-style-type: none"> Seek Consent from people owning land on which Palm Oil will be grown. Pre and post assessments (valuation) be made to facilitate smallholder farmers take on a decision on whether to engage in Palm Oil growing Put in place a grievance mechanism led by Social Development Officer and district community officer and grievance 		✓	✓	<ul style="list-style-type: none"> Number of PAPs Number of complaints registered about inclusion in the project Number of community members in project area unaware of 	MAAIF NEMA Kalungu LG CSO Academia	10,000

Table 9-2 Environmental and Social Management Plan

Project Phase			Potential Impacts	Mitigation Measures	Party Responsible for Mitigation			Monitory Mechanisms /Performance Indicators	Responsible party for monitoring	Budget (USD)
Planning	Construction Establishment	O&M			Contractor/ Company	MAAIF/ NOPP/PMU	DLG			
				register for recording complaints from PAPs				project requirements ▪ Number of complaints registered about lack of project information by local communities		
	✓	✓	Conflicts between workers and community	▪ Develop guidelines for behavioural conduct, including penalties. This should be reflected either as independent document or component to the NOPP Human Resource Manual. ▪ Workers must be sensitized on proper social behaviour and conduct with regard to community norms prior to starting work; workers should be sensitized to avoid engaging in sexual relations with underage girls and married women. ▪ In case of misunderstandings between workers and the local community, use of local leadership should always be sought as a first priority in solving these issues; alternatively, the Grievance Redress Committees can be used to address grievances. Opportunities of collecting community grievances	✓	✓	✓	▪ Record of guidelines developed in line with behavioural conduct ▪ Record cases of behavioural misconduct ▪ Record of induction/training workers on proper behavioural conduct ▪ Grievance register/log ▪ Record of sensitization meetings with a purpose of disclosing project	MAAIF NEMA Kalungu LG LC chairmen	5,500

Table 9-2 Environmental and Social Management Plan

Project Phase			Potential Impacts	Mitigation Measures	Party Responsible for Mitigation			Monitory Mechanisms /Performance Indicators	Responsible party for monitoring	Budget (USD)
Planning	Construction Establishment	O&M			Contractor/ Company	MAAIF/ NOPP/PMU	DLG			
				through community meetings, establishment of a grievance logbook at each project site and suggestion boxes should be established. <ul style="list-style-type: none"> Similarly, in liaison with local leaders, NOPP should prepare local communities – psychologically and otherwise – for the newcomers; efforts be focused on instilling attitudes of tolerance, support and understanding towards the newcomers in the local communities. 				information to the community		
	✓	✓	Nutritional Disorders	<ul style="list-style-type: none"> Encourage smallholder farmers to practice intercropping palm oil with other food crops Carryout training programs to educate smallholder farmers on best farming practices to mitigate nutritional deficiency 		✓	✓	<ul style="list-style-type: none"> Level of intercropping in the Palm Oil plantations Record of training and sensitization program equipping smallholder farmers with intercropping skills 	MAAIF NEMA Kalungu LG	7,000
		✓	Dependency on the Nucleus Farm	<ul style="list-style-type: none"> NOPP should identify land and grow its own Palm Oil rather than entirely relying on smallholders Create incentives that encourage a large number of smallholder farmers to participate in the project to achieve sustainability 		✓	✓	<ul style="list-style-type: none"> Identified alternative land to reduce over reliance on smallholder farmers Implemented incentives luring smallholder 	MAAIF Kalungu LG	50,000

Table 9-2 Environmental and Social Management Plan

Project Phase			Potential Impacts	Mitigation Measures	Party Responsible for Mitigation			Monitory Mechanisms /Performance Indicators	Responsible party for monitoring	Budget (USD)
Planning	Construction Establishment	O&M			Contractor/ Company	MAAIF/ NOPP/PMU	DLG			
								farmers to engage in Palm Oil growing		
	✓	✓	Labour Issues	<ul style="list-style-type: none"> Determine numbers of skilled, semi-skilled and unskilled labour requirements for each phase and assess local resource levels through involving local council chairmen, subcounty and district leaders Implement project specific training and community development programs to increase the skills of farmers and workers The Contractors will be obligated to work within Uganda's labour laws (Employment Act), including restrictions on child labour especially where it can interfere with the child's education. 	✓	✓	✓	<ul style="list-style-type: none"> Level of local community awareness of project progress status. Record of NOPP's employment activities monthly, including number of jobs created by employment type (skilled / semi-skilled / unskilled); number of jobs by gender, employment type and geographical area; and rate of employee turnover by gender and area. 	MAAIF NEMA Kalungu LG LC chairmen MoGLSD	5,000
	✓	✓	Disruption of current sources of livelihoods	<ul style="list-style-type: none"> The Project Affected Persons (PAPs) should be given adequate notices so that they can plan their activities appropriately. Meetings should be held in locations that are easily accessible and close to the targeted community members so that the least inconvenience is subjected. 	✓	✓	✓	<ul style="list-style-type: none"> Number of complaints registered about PAPs being unaware of project activities Record of assessment for alternative 	MAAIF NEMA Kalungu LG LC chairmen MoGLSD	7,000

Table 9-2 Environmental and Social Management Plan

Project Phase			Potential Impacts	Mitigation Measures	Party Responsible for Mitigation			Monitory Mechanisms /Performance Indicators	Responsible party for monitoring	Budget (USD)
Planning	Construction Establishment	O&M			Contractor/ Company	MAAIF/ NOPP/PMU	DLG			
				<ul style="list-style-type: none"> Alternative arrangements for cattle grazing should be assessed. 				arrangements for cattle grazers		
	✓	✓	Increase in HIV and other STIs	<ul style="list-style-type: none"> Have an HIV/AIDS policy and a framework (responsible staff, action plan, etc.) to implement during project execution. This will include a reporting procedure in the event that the community members have any issues to report as a result of the project workers' behaviour and/or negligence. Orient and sensitize workers, smallholder farmers about responsible sexual behaviour with project area communities and inherent health risks associated with HIV/AIDS and other sexually transmitted diseases Management of Social bonding. The pathways for transmission of HIV/AIDS and STIs are well known, foreseeable and can be mitigated. Social bonds are not readily controlled, and the permanence of HIV/AIDS transmission makes this particular impact of social bonding both negative and also positive. Social bonds leading to lasting marriages and children occur in such situations; early pregnancies and sexual 	✓	✓	✓	<ul style="list-style-type: none"> Level of social interaction / fraternization between workers and local community. Number of complaints recorded from community members regarding fraternization with Project workers. Number of engagements and worker's sensitisation on various issues that also include positive social bonds 	MAAIF NEMA Kalungu LG LC chairmen MoGLSD	7,000

Table 9-2 Environmental and Social Management Plan

Project Phase			Potential Impacts	Mitigation Measures	Party Responsible for Mitigation			Monitory Mechanisms /Performance Indicators	Responsible party for monitoring	Budget (USD)
Planning	Construction Establishment	O&M			Contractor/ Company	MAAIF/ NOPP/PMU	DLG			
				exploitation can also occur. It is therefore important to tackle the issue of social bonding with firmness and fairness, forbidding power relationships, which lead to exploitation of mostly women and children, while encouraging relationships that may lead to permanent situations						
	✓	✓	Accidents and injuries attributed to project implementation process	<ul style="list-style-type: none"> ▪ Orient all construction workers on safe work practices and ensure that they are adhered to. ▪ Safety training be conducted routinely on how to prevent and manage incidences on site, and measures to protect the general public from construction site hazards ▪ Have in place safe work procedures to be followed during project implementation to ensure safety of the community as well as the workers 	✓	✓	✓	<ul style="list-style-type: none"> ▪ Number of complaints recorded from the community ▪ Number of accidents recorded attributed to project implementation ▪ Number of safety training conducted for workers, smallholder farmers and community at large 	MAAIF NEMA Kalungu LG LC chairmen MoGLSD	7,000
	✓	✓	Influx of population as result of migrant workers	<ul style="list-style-type: none"> ▪ Develop guidelines for behavioural conduct, including penalties. This should be reflected either as independent document or component to the NOPP Human Resource Manual. ▪ Workers must be sensitized on proper social behaviour and conduct with regard to community norms prior to starting work; workers should be sensitized to 	✓	✓	✓	<ul style="list-style-type: none"> ▪ Record of guidelines developed in line with behavioural conduct ▪ Record cases of behavioural misconduct ▪ Record of induction/training 	MAAIF NEMA Kalungu LG LC chairmen MoGLSD	5,500

Table 9-2 Environmental and Social Management Plan

Project Phase			Potential Impacts	Mitigation Measures	Party Responsible for Mitigation			Monitory Mechanisms /Performance Indicators	Responsible party for monitoring	Budget (USD)
Planning	Construction Establishment	O&M			Contractor/ Company	MAAIF/ NOPP/PMU	DLG			
				<p>avoid engaging in sexual relations with underage girls and married women.</p> <ul style="list-style-type: none"> In case of misunderstandings between workers and the local community, use of local leadership should always be sought as a first priority in solving these issues; alternatively, the Grievance Redress Committees can be used to address grievances. Opportunities of collecting community grievances through community meetings, establishment of a grievance logbook at each project site and suggestion boxes should be established. Similarly, in liaison with local leaders, NOPP should prepare local communities – psychologically and otherwise – for the newcomers; efforts be focused on instilling attitudes of tolerance, support and understanding towards the newcomers in the local communities. 				<p>workers on proper behavioural conduct</p> <ul style="list-style-type: none"> Grievance register/log Record of sensitization meetings with a purpose of disclosing project information to the community 		
	✓	✓	Vulnerability as a result of gender related issues	<ul style="list-style-type: none"> Determine numbers of women who are willing to participate in Palm Oil growing and assess how best they can be included in the program through involving local council chairmen, subcounty and district leaders. 		✓	✓	<ul style="list-style-type: none"> Record of training awareness programs aimed at gender equality Record of women inclusion in Palm Oil growing 	MAAIF NEMA Kalungu LG LC chairmen MoGLSD	5,500

Table 9-2 Environmental and Social Management Plan

Project Phase			Potential Impacts	Mitigation Measures	Party Responsible for Mitigation			Monitory Mechanisms /Performance Indicators	Responsible party for monitoring	Budget (USD)
Planning	Construction Establishment	O&M			Contractor/ Company	MAAIF/ NOPP/PMU	DLG			
				<ul style="list-style-type: none"> Conducting training and awareness programs aimed at gender equality during project implementation. Have in place a framework for compulsory inclusion of women to participate in the NOPP. 						
	✓	✓	Shift in crop type will affect food security	<ul style="list-style-type: none"> Encourage smallholder farmers to practice intercropping palm oil with other food crops Carryout training programs to educate smallholder farmers on best farming practices to balance growth of Palm Oil and food crops. 		✓	✓	<ul style="list-style-type: none"> Level of intercropping in the Palm Oil plantations Record of training and sensitization program equipping smallholder farmers with intercropping skills 	MAAIF NARO Kalungu LG	5,500
	✓	✓	Destruction of agricultural resources	<ul style="list-style-type: none"> Encourage farmers to harvest their produce and enrol into Palm Oil growing thereafter. Having a recruitment procedure which allows smallholders to be taken up by the NOPP at any time of the planting season. 	✓	✓	✓	<ul style="list-style-type: none"> Documented smallholder farmers recruitment and implementation program 	MAAIF NARO Kalungu LG	7,000
			Exposure of pesticides including herbicides to workers and environment	<ul style="list-style-type: none"> Ensure safe use and application of pesticides and herbicides in Palm Oil fields 				<ul style="list-style-type: none"> Level of awareness of smallholder farmers of safe pesticides and herbicides application Record of incidents and injuries sustained from 	MAAIF NARO MoGLSD Kalungu LG	5,500

Table 9-2 Environmental and Social Management Plan

Project Phase			Potential Impacts	Mitigation Measures	Party Responsible for Mitigation			Monitory Mechanisms /Performance Indicators	Responsible party for monitoring	Budget (USD)
Planning	Construction Establishment	O&M			Contractor/ Company	MAAIF/ NOPP/PMU	DLG			
								exposure to agrochemicals		
	✓	✓	Loss of invertebrate fauna as a result of weeding	<ul style="list-style-type: none"> Devise ecological sound procedures of weed control to prevent loss of invertebrate fauna 	✓	✓	✓	Record of safe ecological procedures of weed control	MAAIF NARO Kalungu LG	5,000
	✓	✓	Occupational hazards during crop management	<ul style="list-style-type: none"> Orient smallholder farmers on best safe work practices and ensure that they are adhered to during crop management. Provision of adequate and appropriate PPE such as gloves and gumboots to smallholder farmers Safety training be conducted routinely on how to prevent and manage incidences on farms Have in place safe work procedures to be followed during crop management 	✓	✓	✓	<ul style="list-style-type: none"> Level of awareness of smallholder farmers of safe work practices Record of number of PPE provided Record of incidents and injuries sustained from crop management Record of safety trainings to workers, smallholder farmers 	MAAIF NARO MoGLSD Kalungu LG	7,000
		✓	Impact of Palm Oil growth and propagation	<ul style="list-style-type: none"> Limit over use of agrochemicals as guided by the Ministry of Agriculture, Animal Industry and Fisheries 		✓	✓	<ul style="list-style-type: none"> Record of number of agrochemicals given to smallholder farmers Level of awareness of smallholder farmers of application of agrochemicals 	MAAIF NARO MoGLSD Kalungu LG	5,500
	✓	✓	Contribution to climate change	<ul style="list-style-type: none"> Have a phased implementation plan for Palm Oil growing so as 	✓	✓	✓	<ul style="list-style-type: none"> Level of implementation of 	NFA MAAIF	5,500

Table 9-2 Environmental and Social Management Plan

Project Phase			Potential Impacts	Mitigation Measures	Party Responsible for Mitigation			Monitory Mechanisms /Performance Indicators	Responsible party for monitoring	Budget (USD)
Planning	Construction Establishment	O&M			Contractor/ Company	MAAIF/ NOPP/PMU	DLG			
				harmonise effects brought about by carbon sequestration due to change in land use				plan to phase palm oil growing	DWM MWE Kalungu LG CSO Academia	
		✓	Plant species diversity decline	<ul style="list-style-type: none"> Continued and directed surveys in pristine sections of forests and wetlands Collection of voucher specimens of interest species for confirmation of identifications at herbaria in case they are thought to be new species Adequate inspection of the participating farmers land should be done before land clearance Species composition and relative abundance need to be monitored in both the converted areas and natural areas Vegetation offsets through plantation establishments on designated land by the Kalungu DNR or NFA Establish nurseries for indigenous tree species to be given to farmers for farm boundary planting or woodlot establishment 	✓	✓	✓	<ul style="list-style-type: none"> Record of voucher specimens of interest Record of farm inspection before clearance is carried out Record of indigenous tree species for replanting 	NFA MAAIF DWM MWE Kalungu LG CSO Academia	7,000
		✓	Decline in natural habitats mostly forest, and wetland areas	<ul style="list-style-type: none"> Accurate information on extent and quantity and quality of representative habitats (Forests, wetlands, grasslands and shrublands) 	✓	✓	✓	<ul style="list-style-type: none"> Record of floral surveys carried out within the project area 	NFA MAAIF DWM MWE Kalungu LG	7,000

Table 9-2 Environmental and Social Management Plan										
Project Phase			Potential Impacts	Mitigation Measures	Party Responsible for Mitigation			Monitory Mechanisms /Performance Indicators	Responsible party for monitoring	Budget (USD)
Planning	Construction Establishment	O&M			Contractor/ Company	MAAIF/ NOPP/PMU	DLG			
				<ul style="list-style-type: none">Some areas of natural habitat types need to be maintained in the plantation areasControl access to wetlands by feral animals like cattle, to reduce destruction of breeding grounds of fishSupport catchment management works to foster wetland rehabilitation and their wise use by the participating communities/farmersHabitat for endemic or restrict range species should be protected where it is established the species exist in the project area. Current findings show that little is known about the Nabajjuzi System. However, it is important regionally and globally for biodiversity conservation. Key species such as Sitatunga (Tragelaphus spekei), Grey CrownedCrane, Shoebill, papyrus endemic species such as Papyrus Gonolek and Papyrus Yellow Warbler are known from this site and hence the site is important in maintaining the biodiversity of these speciesTo areas around Katonga wetland, a 100m wide strip of riparian buffer zone shall be maintained to avoid wetland				<ul style="list-style-type: none">Record of cultivated and uncultivated areas within the projectRecord of programs intended towards rehabilitation of wetlandsRecord of measures aimed at conserving ecosystems within the project areaLand cover of the project area	CSO Academia	

Table 9-2 Environmental and Social Management Plan

Project Phase			Potential Impacts	Mitigation Measures	Party Responsible for Mitigation			Monitory Mechanisms /Performance Indicators	Responsible party for monitoring	Budget (USD)
Planning	Construction Establishment	O&M			Contractor/ Company	MAAIF/ NOPP/PMU	DLG			
				encroachment and subsequent degradation <ul style="list-style-type: none"> Integrate remote sensing technology to monitor land use and cover change following the implementation of oil palm project to counteract encroachment into these pristine and fragile ecosystems 						
	✓	✓	Decreased availability of forest products	<ul style="list-style-type: none"> Encourage forestation and afforestation programmes among the participating communities to ensure sustainable utilization of forest resources for production Improve agricultural extension services Promote more food campaign programs by CBOs, local government departments and NGOs 		✓	✓	<ul style="list-style-type: none"> Afforested areas in regards to vegetation restoration of the project Record of implementation of agricultural extension services Record of selected agricultural services towards smallholder farmers 	NFA MAAIF DWM MWE Kalungu LG CSO Academia	5,000
	✓	✓	Decline of energy resources/ increase in charcoal burning practices	<ul style="list-style-type: none"> Establish awareness programmes on energy saving stoves Support agroforestry practices on enhance wood fuel farm production as an option to the declining energy sources 		✓	✓	<ul style="list-style-type: none"> Record of awareness aimed at energy saving Level of support given to agroforestry practices 	NFA MAAIF DWM MWE Kalungu LG CSO Academia	7,000
	✓	✓	Soil erosion	<ul style="list-style-type: none"> Trenching shall be done during the early stages of oil palm establishment due to the large gap sizes to foster water 	✓	✓	✓	<ul style="list-style-type: none"> Project area drainage patterns 	NFA MAAIF DWM MWE	3,000

Table 9-2 Environmental and Social Management Plan

Project Phase			Potential Impacts	Mitigation Measures	Party Responsible for Mitigation			Monitory Mechanisms /Performance Indicators	Responsible party for monitoring	Budget (USD)
Planning	Construction Establishment	O&M			Contractor/ Company	MAAIF/ NOPP/PMU	DLG			
				retention, soil stability and water penetration <ul style="list-style-type: none"> Practice mulching and adding organic fertilizers or compost to the soil Ensure proper disposal of woody debris generated especially during site clearance Plant cover crops over time for example, Mucuna bracteate, a leguminous plant that does not only add Nitrogen to the soil but reduces impact of soil friability reduce soil erosion proneness. Install sediment traps and adoption of soil and water management practices on site • Ensure visual and on-spot inspection of project area 				<ul style="list-style-type: none"> Extent of intercropping palm oil with cover crops Record of areas prone to erosion within the project area Method of planting 	Kalungu LG CSO Academia	
		✓	Proliferation of invasive species	<ul style="list-style-type: none"> Prepare a weed management plan prior to commencement of clearing activities Monitor the introduction of any alien or exotic species on the project site, document and disseminate to the district natural resources office and neighbouring districts within Nabajjuzi wetland system Ramsar site 	✓	✓	✓	<ul style="list-style-type: none"> Weed management plan Invasive management plan 	NFA MAAIF DWM MWE Kalungu LG CSO Academia	7,000
	✓	✓	Habitat destruction through vegetation	<ul style="list-style-type: none"> The critical habitats for insects mainly forest reserves, permanent and seasonally flooded wetlands should be 	✓	✓	✓	<ul style="list-style-type: none"> Extent of palm oil plantations 	NFA MAAIF DWM MWE	5,500

Table 9-2 Environmental and Social Management Plan

Project Phase			Potential Impacts	Mitigation Measures	Party Responsible for Mitigation			Monitory Mechanisms /Performance Indicators	Responsible party for monitoring	Budget (USD)
Planning	Construction Establishment	O&M			Contractor/ Company	MAAIF/ NOPP/PMU	DLG			
			clearing and its associated adverse impacts like loss of suitable foraging, roosting and breeding habitat for insects.	<p>protected so that the area retains its ecological integrity. No palm oil growing activities should be earmarked in these areas.</p> <ul style="list-style-type: none"> Open grassland areas are highly recommended for palm oil growing since in the long term will be replaced with Palm forests, this in the long term will compensate for vegetation losses and carbon sinks. All developments should observe the 200m buffer distance stipulated by NEMA under the National Environment Act Cap 153 for works along water courses especially the Lake and wetland areas. 				<ul style="list-style-type: none"> Record of number of critical habitats for insects 	Kalungu LG CSO Academia	
	✓	✓	Habitat alteration may lead to reduction in species richness resulting from unfavourable habitat with low food availability and shelter.	<ul style="list-style-type: none"> Use only the recommended amount of fertilizer on the plant and also apply fertilizers during appropriate times of the year and avoid applying fertilizers near water sources such as ponds, wells, waterways and Lakes. 		✓		Fertilizer application schedule/plan	NFA MAAIF DWM MWE Kalungu LG CSO Academia	10,000
	✓	✓	Habitat destruction through vegetation	<ul style="list-style-type: none"> Limit cutting down of Vegetation to only project areas 	✓	✓	✓	<ul style="list-style-type: none"> Biodiversity management plan Extent of vegetation 	NFA MAAIF DWM MWE	20,000

Table 9-2 Environmental and Social Management Plan

Project Phase			Potential Impacts	Mitigation Measures	Party Responsible for Mitigation			Monitory Mechanisms /Performance Indicators	Responsible party for monitoring	Budget (USD)
Planning	Construction Establishment	O&M			Contractor/ Company	MAAIF/ NOPP/PMU	DLG			
			clearing and its associated adverse impacts like loss of suitable resting places for Large/medium size mammals, primates & bats	<ul style="list-style-type: none"> Identifying areas with less vegetation cover to minimize habitat loss Observe the 200m buffer distance stipulated for water bodies by NEMA Erosion control methods such as use of contour bands, cover plants, Terraces among others should be used. 				<ul style="list-style-type: none"> clearance within the project area Extent of palm oil plantations 	Kalungu LG	
	✓	✓	High levels of noise affect Bat foraging and navigation	<ul style="list-style-type: none"> Limit noise levels by use of low noise producing equipment Use of sound mufflers to reduce noise where possible 	✓	✓	✓	<ul style="list-style-type: none"> Record of noise monitoring assessment 	MAAIF MWE Kalungu LG	10,000
	✓	✓	Reduction in Air Quality and effect on Species Sensory perception	<ul style="list-style-type: none"> Carryout regular wetting of surfaces to suppress emission of dust and particulate matter within the project area Limit traffic flow and ensure that driver of project vehicles respect designated speed limits Ensure regular servicing and maintenance of project vehicles 	✓	✓	✓	<ul style="list-style-type: none"> Traffic management plan Record of air quality monitoring 	MAAIF MWE Kalungu LG	10,000
	✓	✓	During the land clearing some fauna especially the crawling fauna may be directly buried / killed intentionally or un-intentionally. This is	<ul style="list-style-type: none"> Attempts to scare herps or translocate them before undertaking vegetation clearance is recommended. 	✓	✓	✓	<ul style="list-style-type: none"> Biodiversity management plan 	MAAIF MWE Kalungu LG	20,000

Table 9-2 Environmental and Social Management Plan

Project Phase			Potential Impacts	Mitigation Measures	Party Responsible for Mitigation			Monitory Mechanisms /Performance Indicators	Responsible party for monitoring	Budget (USD)
Planning	Construction Establishment	O&M			Contractor/ Company	MAAIF/ NOPP/PMU	DLG			
			especially so for snakes which people think are dangerous to their lives (poisonous) and that snakes only deserve death.							
	✓	✓	Increase in emission of particulate matter	<ul style="list-style-type: none"> • Conduct regular monitoring of air quality of the environment • Adopt an appropriate dust suppression method such as wetting of access roads at adequate frequency based on a risk assessment. • All truck loads that access the site will be covered; • Stockpiles of construction materials and other raw materials should be shielded from wind using tumpline every time they ae to access the project area • A speed limit of 40 km/h for light vehicles and 30 km/h for heavy vehicles should be maintained on route used to access the site especially during the dry season and during windy conditions; ▪ Minimize accumulation of loose soils encountered during land preparation 		✓	✓	<ul style="list-style-type: none"> ▪ Record of air quality monitoring ▪ Record of number of complaints attributed to emission of particulate matter ▪ Schedule for wetting project area ▪ Record of incidents of vehicles exceeding set speed limits 	MAAIF NEMA MWE Kalungu LG	10,000

Table 9-2 Environmental and Social Management Plan

Project Phase			Potential Impacts	Mitigation Measures	Party Responsible for Mitigation			Monitory Mechanisms /Performance Indicators	Responsible party for monitoring	Budget (USD)
Planning	Construction Establishment	O&M			Contractor/ Company	MAAIF/ NOPP/PMU	DLG			
	✓	✓	Emission of fumes from project equipment and automobiles	<ul style="list-style-type: none"> Exhaust emissions from vehicles operating within the site, including trucks, excavators, diesel generators or other equipment, will be controlled by the contractor by ensuring that emissions are minimized through regular servicing of machinery to meet the relevant emission standards; Ensure that the engines of all vehicles and machinery on site are not left running unnecessarily; Equipment to be used in the project to comply with recognized performance design standards; All emission-producing equipment will be operated only when necessary and unnecessary idling of equipment will be avoided; 		✓	✓	<ul style="list-style-type: none"> Record of air quality monitoring Record of regular servicing of all equipment and automobiles 	MAAIF NEMA MWE Kalungu LG	10,000
	✓	✓	Noise nuisance to the community	<ul style="list-style-type: none"> Use of equipment in good working condition Use of muffles / dampeners on equipment to make it quieter and more difficult to hear especially on the generator Ensure to replace noisy equipment with quieter one whenever assessment indicate so. 		✓	✓	<ul style="list-style-type: none"> Record of noise monitoring Record of regular servicing of all equipment and automobiles PPE inventory 	MAAIF NEMA MWE Kalungu LG	10,000

Table 9-2 Environmental and Social Management Plan

Project Phase			Potential Impacts	Mitigation Measures	Party Responsible for Mitigation			Monitory Mechanisms /Performance Indicators	Responsible party for monitoring	Budget (USD)
Planning	Construction Establishment	O&M			Contractor/ Company	MAAIF/ NOPP/PMU	DLG			
				<ul style="list-style-type: none"> For activities where noise levels are measured to be over 60dB(A), limit working hours to day time. Provide hearing protection devices to employees working with equipment producing 85dB(A) and above continuously for more than 8 consecutive hours. Procure hearing devices from professional suppliers Regularly monitoring of noise levels to regulate activities when levels exceed permissible limits. 						
	✓	✓	Damage of underground archaeological artefacts including potsherds, lithic artefacts, iron implements and other cultural materials. Disturbance or loss of cultural heritage	<ul style="list-style-type: none"> A qualified archaeologist should be employed to help map all the heritage sites and help record chance finds especially on the proposed nucleus farm. A watching brief during vegetation removal and soil stripping Conducting community pre-development awareness programs for the small-scale farmers on cultural heritage conservation alongside development Follow chance finds procedures during implementation phase 	✓	✓	✓	<ul style="list-style-type: none"> Documentation (records, reports etc.) demonstrating that an archaeological and cultural heritage investigation has been conducted. Records/ reports demonstrating compliance to the Cultural Heritage Management Plan (CHMP) Community training attendance 	MAAIF MTWA MWE Kalungu LG	25,000
	✓	✓	<ul style="list-style-type: none"> Cutting down of culturally and 	<ul style="list-style-type: none"> Project activities should avoid cultural sites recorded, including trees, caves, landscapes, forests of historical or cultural 	✓	✓	✓	<ul style="list-style-type: none"> Documentation (records, reports etc.) demonstrating that an 	MAAIF MTWA MWE Kalungu LG	10,000

Table 9-2 Environmental and Social Management Plan

Project Phase			Potential Impacts	Mitigation Measures	Party Responsible for Mitigation			Monitory Mechanisms /Performance Indicators	Responsible party for monitoring	Budget (USD)
Planning	Construction Establishment	O&M			Contractor/ Company	MAAIF/ NOPP/PMU	DLG			
			<p>historical sensitive trees and forests These include bark cloth trees</p> <ul style="list-style-type: none"> • Disruption of access to cultural sites, caves, trees and hills. • Lack of privacy to sacred sites, shrines and cultural trees. • Destroying and cutting down numerous local herbs/med icinal plants and trees. 	<p>significance. This will minimize on the project impacts</p> <ul style="list-style-type: none"> ▪ Ensure that there is accessibility to cultural sites recorded especially shrines, caves and trees encircling these sites should be avoided. ▪ Need to identify and preserve medicinal plants 				<p>archaeological and cultural heritage investigation has been conducted.</p> <ul style="list-style-type: none"> ▪ Records/ reports demonstrating compliance to the Cultural Heritage Management Plan (CHMP) 		

Table 9-2 Environmental and Social Management Plan

Project Phase			Potential Impacts	Mitigation Measures	Party Responsible for Mitigation			Monitory Mechanisms /Performance Indicators	Responsible party for monitoring	Budget (USD)
Planning	Construction Establishment	O&M			Contractor/ Company	MAAIF/ NOPP/PMU	DLG			
	✓	✓	Over use of agrochemicals	<ul style="list-style-type: none"> • Develop a fertiliser application programme based on results from soil analysis with assistance from NARI/NARO for the immature period. • Undertake foliar analysis to guide an annual fertiliser programme for the mature period of oil palm trees • Fertiliser use shall be carefully regulated to minimise costs and negative impacts on the environment • Avoid foliar application during rainy hours to reduce washing and run off into water courses. • Develop fertiliser application design which targets spraying fertiliser where the plant uptake is very efficient to avoid fertiliser getting into runoff. • Use of herbicides at pre-nursery and nursey stages shall be strictly prohibited. • Apply fungicides at pre-nursery and nursery stage to control leaf diseases. • Apply insecticides to combat crickets. • Use traditional and mechanical nursery management techniques of weeding to keep off the development of <i>Recilia mica</i>. 		✓	✓	Environmental information Document Environmental Evaluation Study/performance Herbicide/pesticide application schedule/plan Records for tools, accidents in field and workers health Complaint records on air quality change Monitoring (physical and visual) reports of field planting Protective gear Records on training and toolbox talks to field workers	MAAIF NARO MWE DWM Kalungu DLG	25,000

Table 9-2 Environmental and Social Management Plan																						
Project Phase			Potential Impacts	Mitigation Measures	Party Responsible for Mitigation			Monitory Mechanisms /Performance Indicators	Responsible party for monitoring	Budget (USD)												
Planning	Construction Establishment	O&M			Contractor/ Company	MAAIF/ NOPP/PMU	DLG															
				<ul style="list-style-type: none">• Use of herbicides (mostly glyphosate) during the immature period, could be necessary in the interlines to spot-spray grass and other weeds.• During the mature period, apply strip weeding where manual labour is limited.• Adopt and implement an integrated Pest Management Programme																		
		✓	Production of palm oil mill effluent (POME)	<ul style="list-style-type: none">• Adopt a zero-waste management philosophy, where all the ffbs are utilised.• In order to produce effluent that meets the international standards, the oil mill design shall incorporate; a stalk processing press and muncher, a trip-phase decanting system, an effluent treatment system and an effluent/land application system.• POME will be collected and stored in anaerobic ponds <table><tr><th>Paramete rs</th><th>Untreated POME</th><th>Uganda standards</th></tr><tr><td>pH</td><td>4.0</td><td>6.0-8.0</td></tr><tr><td>Temperatu re (°C)</td><td>80-90</td><td>20-35</td></tr><tr><td>Biochemic al Oxygen Demand (BOD)ma/l</td><td>25,000</td><td>50</td></tr></table>	Paramete rs	Untreated POME	Uganda standards	pH	4.0	6.0-8.0	Temperatu re (°C)	80-90	20-35	Biochemic al Oxygen Demand (BOD)ma/l	25,000	50		✓	✓	Oil mill site lay out Waste management plan Laboratory measurements of water quality Handling practices and storage facilities of waste Daily and weekly inspection reports of oil, fuel and grease ESIA reports for Oil mill components	MAAIF BIDCO OPUL NEMA Kalungu LG	Part of CPO Mill operation budget
Paramete rs	Untreated POME	Uganda standards																				
pH	4.0	6.0-8.0																				
Temperatu re (°C)	80-90	20-35																				
Biochemic al Oxygen Demand (BOD)ma/l	25,000	50																				

Table 9-2 Environmental and Social Management Plan													
Project Phase			Potential Impacts	Mitigation Measures			Party Responsible for Mitigation			Monitory Mechanisms /Performance Indicators	Responsible party for monitoring	Budget (USD)	
Planning	Construction Establishment	O&M					Contractor/ Company	MAAIF/ NOPP/PMU	DLG				
				<div><div>Suspende d Solids (SS) mg/l</div><div>19,000</div><div>100</div></div> <div><div>Total Nitrogen (TN) mg/l</div><div>770</div><div>10</div></div> <div><div>Oil and grease (mg/l)</div><div>8,000</div><div>10</div></div> <div><ul style="list-style-type: none">• Apply the decomposed effluent to the nucleus plantation and gravity irrigation system.</div>									

10 0 CONCLUSION AND RECOMMENDATIONS

10.4 Conclusion

This ESIS presents identified potential negative environmental and social impacts and proposed mitigation measures for incorporation during the project design to eliminate, minimise, mitigate and offset during project implementation.

The contractor and subcontractors shall comply with the Government of Uganda's policies, laws, and regulations and best international industry practice regarding Environmental, Social, and Health and Safety (ESHS) requirements.

10.5 Recommendations

In the event that the project is approved;

- The developer should ensure that the mitigation measures proposed in this report are implemented in order to minimize and/ or avoid the identified adverse environmental and social impacts of the proposed project;
- Proper waste management facilities and emergency preparedness/response measures must be put in place;
- The developer should also ensure that the ESMP (Table 9-2) is available to the relevant parties responsible for implementing it.
- The proposed monitoring plan should also be implemented to track the effectiveness of mitigation measures and hence further improvement of the mitigation plan. Monitoring will be used as a means of ensuring compliance with national and international standards.

To supplement the ESMP, contractors'/project management should develop the following Environmental management plans:

- Stakeholder Engagement Plan
 - Waste Management Plan
 - Chemicals/Fertilizer Management Plan
 - Occupational Health and Safety Plan;
 - HIV/AIDS Prevention Plan;
 - Erosion and Sediment Control and Drainage Management Plan;
 - Environmental Restoration plan;
 - Traffic Management plan
 - Biodiversity Management Plan
-
- The developer should ensure that on completion of project works, all exploited work sites are restored to as near as possible their original state and in accordance with the developed and approved restoration plans.
 - An Environmentalist, Sociologist, and Health and Safety Officer, among other staff should be recruited to monitor the implementation of the ESMP.

- The contractor's safeguards officers should submit to the developer/Supervising Consultant monthly ESHS performance reports.
- The developer should keep records and make annual reports to the NEMA describing how far the project conforms to the statements in the ESIS.
- The developer should obtain any necessary permits/licenses/approval before commencement of the project.
- Post ESIA audits works should be carried out to ascertain compliance of the project with the ESMMP, ESIA Conditions of Approval from NEMA and the environmental legal framework and related requirements Annual environmental audits are also in compliance with the National Environment Act, 2019;
- In compliance with the National Environment Act, 2019, if the developer wishes to add any other component onto the project which was not considered under this assessment, a fresh separate Environmental and Social Impact Assessments (ESIA) should be undertaken to determine its compatibility with the immediate environment, its impacts on the environment and to identify appropriate mitigation measures for its adverse impacts. The ESIA should be conducted before the commencement of any works. The ESIA should be conducted by qualified and registered ESIA practitioners/firms.

REFERENCES

1. Akite, P. (2019). Status of Selected insect fauna (Butterflies and dragonflies) of the selected wetland systems: Sio-Siteko, Sango Bay-Minziro and Semliki Delta. Dept of Zoology Entomology and Fisheries Sciences, Makerere University, Uganda
2. Bakamwesiga H, Kasoma P, Katabarwa D, Pomeroy D 2000. Conservation of Biodiversity in the Sango Bay Area, Southern Uganda. *J East Afr Nat Hist* 89: 37-44.
3. Barthel M, Jennings S, Schreiber W, Sheane R, Royston S, Fry J, Khor YL, McGill J. 2018. Study on the environmental impact of palm oil consumption and on existing sustainability standards. European Union Report: ISBN 978-92-79-80226-3. Pg. 396.
4. Behangana M, Arusi J 2004. The distribution and diversity of amphibian fauna of Lake Nabugabo and Surrounding Arrears. *Afr J Ecol* 42 Suppl 1: 6-13.
5. Behangana M, Luiselli L 2008. Habitat niche community-level analysis of an amphibian assemblage at Lake Nabugabo, Uganda. *Web Ecol* 8: 125-134.
6. Behangana, M. Aluziyo, C. Dendi, D. Luiselli, L. Hughes, D. and Greenbaum, E. 2019. Herpetofaunal diversity and community structure at Lake Nabugabo and surrounding Ramsar area wetlands in southern Uganda. *Vie Milieu*, 2019, 69 (2-3).
7. Behangana, M. and Arusi, J. 2004. The distribution and diversity of amphibian fauna of Lake Nabugabo and surrounding areas. *Afr. J. Ecol.*, 42 (Suppl. 1) 6-13.
8. Bennun, L. A. and P. Njoroge (1996). Birds to watch in East Africa: a preliminary red data list. Research Reports of the Centre for Biodiversity, National Museums of Kenya: Ornithology 23:1–16.
9. Bennun, L. A. and P. Njoroge (1996). Birds to watch in East Africa: a preliminary red data list. Research Reports of the Centre for Biodiversity, National Museums of Kenya: Ornithology 23:1–16.
10. Busulwa H, Mafabi P, Nadwula LM 2001. A compilation of Scientific Information on Nabugabo Ramsar Site, Uganda. Proc Sci Conf held Nabugabo in Jan 2001.
11. Byaruhanga, A., Kasoma, P and Pomeroy, D. (2001). Important bird areas in Uganda. Kampala: Nature Uganda
12. Carswell, M., Pomeroy, D., Reynolds, J. and Tushabe, H. (2005). The Bird Atlas of Uganda. British Ornithologist's Club and British Ornithologists' Union.
13. Channing A, Howell KM 2006. Amphibians of East Africa. Ed Chimaira, Frankfurt am Main.
14. Comte I, Colin F, Whalen JK, Grunberger O, Caliman JP. 2012. Agricultural practices in oil palm plantations and their impact on hydrological changes, nutrient fluxes and water quality in Indonesia: A review. *Advances in Agronomy*: 71 – 124
15. ESA CCI Land Cover 2022. Land cover maps at 300 m resolution. Downloaded from: <http://maps.elie.ucl.ac.be/CCI/viewer/download.php> on 26-03-2022.
16. Gregory, R.D., Noble, D.G., Custance, J. (2004). The state of play of farmland birds: population trends and conservation status of lowland farmland birds in the United Kingdom. *Ibis*, 146 (Suppl. 2), 1–13.
17. <https://www.cbd.int/doc/world/ug/ug-nbsap-v2-en.pdf>
18. <https://www.intechopen.com/chapters/76889>
19. <https://www.nema.go.ug/projects/national-environment-act-2019>

20. Katende AB, Pomeroy DE 1998. Was the Sango Bay area of Uganda a forest refugium? *Bull East Afr Nat Hist Soc* 27(1): 6-9.
21. Kati, V.I. & Sekercioğlu, C.H. (2006). Diversity, ecological structure, and conservation of the landbird community of Dadia reserve, Greece. *Diversity and Distributions*, 12, 620-629.
22. Maluin F, Hussein MZ, Idris AS. 2020. An overview of the oil palm industry: challenges and some emerging opportunities for nanotechnology development. *Agronomy* 10: 356 – 376
23. Ministry of Water and Environment (2017). Lake Nabugabo Wetlands System Ramsar Site Handbook Ministry of Water and Environment, Kampala, Uganda.
24. Ministry of Water and Environment 2015: The Economic Value of Biodiversity and Ecosystem Services in the Lake Nabugabo Wetland Complex. Ministry of Water and Environment, Kampala, Uganda.
25. Namaganda, M 2019: Documenting Plant Diversity in the Trans-boundary Wetlands of Semliki Delta, Sango Bay-Minziro and Sio-Siteko, Uganda. Department of Plant Sciences, Microbiology and Biotechnology, Makerere University.
26. Ndubisi, F., DeMeo, T., & Ditto, N. D. (1995). Environmentally sensitive areas: a template for developing greenway corridors. *Landscape and Urban Planning*, 33(1-3), 159-177.
27. Nile Basin Initiative 2020: Trans-boundary Wetland Management Plan for the Sango Bay-Minziro Wetland between the Republic of Uganda and the United Republic of Tanzania, Nile Basin Initiative Secretariat, Entebbe, Uganda.
28. Pomeroy, D. (1992). Counting birds. A guide to assessing numbers, biomass and diversity of Afrotropical birds. AWF technical handbook series. pp 393-408.
29. Schrier-Uijl A, Silvius M, Parish F, Lim KH, Rosediana S, Anshari G. 2013. Environmental and social impacts of oil palm cultivation on tropical peat – a scientific review. *Reports from the Technical Panels of the 2nd Greenhouse Gas Working Group of the Roundtable on Sustainable Palm Oil (RSPO)* pp.131 – 161.
30. Spawls S, Howell K, Drewes C 2006. Pocket Guide to the Reptiles and Amphibians of East Africa. A and C Black Publishers, London.
31. Spawls S, Howels K, Drewes C, Ashe J 2002. A Field Guide to the Reptiles of East Africa. A and C Black Publishers, London and San Diego.
32. Stevenson, J. and Fanshawe, J. (2002). Field guide to the birds of East Africa Kenya, Tanzania, Uganda, Rwanda, Burundi. T & A D Poyser LTD, UK.
33. Stevenson, J. and Fanshawe, J. (2002). Field guide to the birds of East Africa Kenya, Tanzania, Uganda, Rwanda, Burundi. T & A D Poyser LTD, UK.
34. Tchindjang Mesmin, Ludovic Miaro III, Fideline Mborongong, Gilles Etoga, Eric Voundi and Emmanuel Pierre Jonathan Ngom (2021): Environmental Impacts of the Oil Palm Cultivation in Cameroon. *Published in Elaeis guineensis* by Hesam Kamyab. Published March 16th 2022. ISBN978-1-83962-762-0. Print ISBN978-1-83962-755-2. DOI: 10.5772/intechopen.97862
35. The Constitution of the Republic of Uganda, 1995.
36. The National (Wetlands, Rivers, and Lakeshore Management) Regulations, 2000.
37. The National Environment (Management of ozone depleting substances and products) Regulations S.I.No. 48, 2020
38. The National Environment (Oil Spill Prevention and Preparedness and Response) Regulations, 2020.

39. The National Environment (Waste Management) Regulations, S.I. No. 49, 2020.
40. The National Environment Act, No.5, 2019
41. The National Environment Management Policy, 1994.
42. The National Environmental (Audit) Regulations S.I. No.47, 2020.
43. The National Environmental (Strategic Environment Assessment) Regulations, S.I. No. 50, 2020
44. The Public Health (Control of COVID-19) (No.2) Rules, 2020.
45. The World Bank Environmental and Social Standards, 2017.
46. The World Bank Environmental, Health and Safety Guideline, 2007.
47. UBoS 2017: Uganda National Household Survey 2016/17. Uganda Bureau of Statistics, Kampala, Uganda.
48. UBoS 2018: Annual Agricultural Survey 2018. Uganda Bureau of Statistics, Kampala, Uganda.
49. UBoS 2021: Statistical Abstract 2021. Uganda Bureau of Statistics, Kampala, Uganda.
50. UNEP and NBI 2021: The Economics of Ecosystems and Biodiversity TEEAgriFood Study in Urban and Peri Urban Areas: Case Study of the Mabamba Bay Wetland System in Uganda. Collaborative Study between UNEP and the Nile Basin Initiative, Entebbe, Uganda.
51. USAID 2016: Economic Valuation of Sango Bay-Minziro Ecosystem. Planning for Resilience in East Africa through Policy, Adaptation, Research and Economic Development (PREPARED) Project of the Lake Victoria Basin Commission, USAID Nairobi, Kenya.
52. WMD/NU (2008). Implementing the Ramsar Convention in Uganda: A Guide to the management of Ramsar Sites in Uganda. Wetland Management Division/Nature Uganda, Kampala.

APPENDICES

Appendix 1: Letter of Approval of Terms of Reference for the ESIA of Palm Oil Plantations in Kalungu District



NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)

NEMA/ 4.5

June 2, 2022

The Project Manager
National Oil Palm Project (NOPP),
Ministry of Agriculture, Animal Industry and Fisheries,
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342758, 342759, 342717

Fax: 256-414-257521 / 232680

E-mail: info@nemaug.org

Website: www.nemaug.org

**RE: SCOPING REPORT AND TERMS OF REFERENCE FOR
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE
PROPOSED ESTABLISHMENT OF SMALLHOLDER OIL PALM
PLANTATIONS IN KALUNGU DISTRICT (EIATOR9372)**

The above subject matter refers.

During the review, we noted as follows:

- a) You have mobilized 24 smallholder units, as per the GPS coordinates. However, you are silent on the total acreage of these units relative to the target of 3,000 hectares for the hub, and not clear whether indeed you are no longer mobilizing smallholders in Kalungu District.
- b) You provided GPS points but these cannot allow us generate polygons for use to determine whether the farm units shown to be near wetlands are actually not in wetlands.
- c) The map on page 10 of the Scoping Report and Terms of Reference shows some of the proposed smallholder farms to be in wetlands. Indeed, 11 of out the 24 units are perfectly in the wetland (attached figure).

In respect to (a), above, kindly note that we want to be sure the assessment is complete, and in respect to (b) and (c), above, our advise is that you **generate GPS coordinates of each unit** and **liaise with the Wetlands Management Department, in the Ministry of Water and Environment**, to map the wetlands in the project area. Using the wetlands data, eliminate all those units shown to be in wetlands, and only undertake assessment for those on dry land, **assuming these make the targeted area for the hub**. In addition, work with agronomists at the National Agriculture Research Laboratory to assess the suitability of the project land

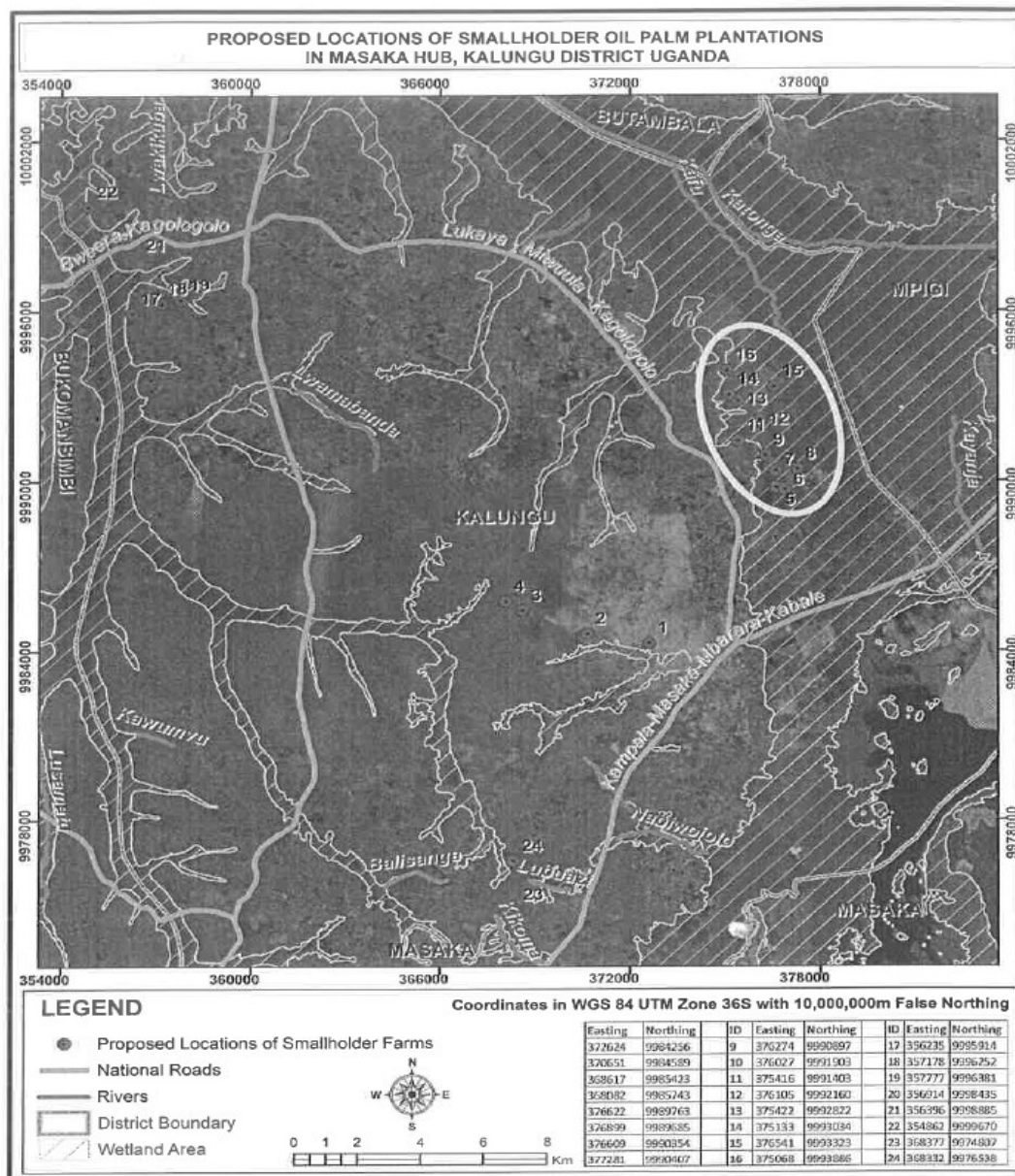
for oil palm cultivation. **Be sure to use the wetland map and the land suitability assessment to develop a land use plan of smallholder fields.** You are advised to consult Kalungu District Local Government, this Authority and Ministry of Lands, Housing and Urban Development, when developing this plan, and **be sure to make use of these data during the assessment.** In addition to this and the proposals contained in the Scoping Report and Terms of Reference:

- a) Undertake comprehensive evaluation of all the potential impacts and risks associated with the proposed project activities in the area, and include an exhaustive environmental and social management plan (ESMP), discussing ways in which the potential environmental and social impacts arising from project activities will be mitigated at every stage of project implementation.
- b) Append to the ESIA report GPS coordinates of the boundary of the wetlands in the project area.
- c) Append to the ESIA report the land suitability report and land use map referred to above.
- d) Append to the ESIA report a list of all the smallholders who have agreed to participate in the project, proof of agreement and terms of engagement, and legible copies of land ownership documents for each smallholder.
- e) Include the cost of the project based upon estimates from a certified valuer, in accordance with Regulation 19(1) of the National Environment (Environment and Social Assessment) Regulations, S.I. No. 143/2020.
- f) Accompany the ESIA submission with evidence of payment of the 30% ESIA fees, in accordance with Regulation 49 of the National Environment (Environment and Social Assessment) Regulations, S.I. No. 143 of 2020.



Dr. Jerome S. Lugumira

For: EXECUTIVE DIRECTOR



Circled are units in a wetland. Also refer to your map on page 10 of the Scoping Report and Terms of Reference.

Appendix 2: Minutes of Meetings with stakeholders

Meeting held with Ministry of Agriculture, Animal Industry and Fisheries

Date and place of the meeting.	8/2/2022
Purpose of the meeting	To collect social and environmental input into the proposed oil palm growing project in Masaka Hub
Present	Connie Magomu Masaba NOPP Robert Charles Aguma, NOPP Emmanuel Mukama, NOPP Benyamen Maraka, NOPP Ofono Larrey OPUL Mathias Ofumbi, Newplan Olivia Namutosi, Newplan Peter Kyakwise, Newplan
Notes recorded by.	Olivia Namutosi
<u>Key issues raised</u> <ul style="list-style-type: none"> Noted that government is making effort to expand oil palm growing to other areas such as Mukono, Masaka, Buikwe and Mayuge so as to meet current national demands. Trials are being conducted in other areas other than those listed above Before introduction of oil palm, 96% of oil palm was imported yet this could be produced locally Oil palm is economically interesting because harvest extend to between 20-25 years at an interval of 10 days which grantees regular cash flows for participating households. The target is to produce 100,000 tonnes although currently production is at 15,000 with hope of raising to 20,000 once harvests start in Buvuma. NOPP noted that the crop had negative publicity but through continuous sensitisation, it is gradually being embraced. Currently about 2000 out growers from Kalangala are receiving 5bn monthly. This has led to mounting pressure from other areas to get on board. In regard to policy, legal and institutional framework guiding the project the list below was shared by NOPP National Development Plan 3, National Environment Management authority, National Forestry Authority, Ministry of Justice and Constitutional Affairs, Ministry of Agriculture Animal Industry and Fisheries, Agriculture Sector Strategic Plan Under NDP3, Ministry of Trade, Industry and Cooperatives, Ministry of Finance and Economic Planning, Ministry of Lands, Program for agro-industrialisation within the NDP3, Public Finance Management and National Agricultural Chemicals Control Board. Policies National Agriculture Policy, National Fertilizer Policy, Agriculture and Irrigation Policy, Draft Mechanisation Policy, National Agricultural Research System Policy. Agricultural Chemical Control Act, Energy Policy, Land Policy, National HIV Policy, National Health Policy, Occupation Health and Safety Policy, Historical Monuments Act Cap 46 The project has four main components i.e.; Oil palm production, alternative livelihood which includes agricultural and non-agricultural enterprises, developing a policy for the Oil Palm crop and Project management. Impacts <ul style="list-style-type: none"> Greenhouse gas emissions from the processing plant and vegetation clearance. NOPP informed the meeting that this impact is controlled by; <ul style="list-style-type: none"> -Deliberate re-forestation in farming communities is supported and encouraged, growing of legumes as cover crops within the oil palm gardens, conservation tilling (circling) 	

ploughing only around the crop, following the do not harm principle to the dot and slash and burn is totally discouraged.

- Because there is heavy reliance on fertilizers during the oil palm crop production cycle, observation of the 200m buffer zone by farmers is emphasised and enforced to limit contamination. Enrichment of the buffer area through greening, spot application of fertiliser and adherence to required amounts to minimise surplus that could be washed away into neighbouring environs.
- Undertaking environment and social impact assessment before implementation of the project
- Discouraging planting of the crop on slopes higher than 25° because these present higher chances of erosion. Other land management techniques such as terracing are encouraged
- Farmers are organised in groups with extension workers who oversee farming activities to ensure adherence to set standards.
- Food security

The minimum threshold land holding for households that intend to participate in oil palm growing is 2 hectares and at least an acre above the 2hectares for food crop growing.

- Waste management: They indicated that organic waste is buried or taken back to the garden as manure. Inorganic waste is buried for it to decompose while licensed waste handles collect and dispose of hazardous wastes.
- The KOPGT has contributed to education in Kalangala through construction of a school. They informed that the project has a component of alternative livelihood through which a wider community will benefit.
- Being a government project, government will offer support in areas found to be lacking such as support to improve social service delivery
- Child labour: clear labour and employment policies will be set and followed to the dot. No child will be employed in oil palm production related activities. Sensitisation is continuous to emphasis this.

Minutes of meeting held with Ministry of Works and Transport

Date and place of the meeting.	11/2/2022
Purpose of the meeting	To collect social and environmental input into the proposed oil palm growing project in Masaka Hub
Present	Charles Mutemo (MWT) Winfred Gena (MWT) Juliet Atino (MWT) Isaac Serukenya (CEO Newplan) Mathias Ofumbi (Newplan) Olivia Namutosi (Newplan)
Notes recorded by.	Olivia Namutosi
<u>Key issues raised</u>	
<ul style="list-style-type: none"> ▪ The ministry has been fully involved from the time of conception in Kalangala hence the MWT is aware of the activities involved. ▪ Access roads should be in line with ministry guideline general standards for roads under this category. ▪ They guided that if ferries are involved clearance is required from the Ministry of Works and Transport which provides specific guidance in that regard. ▪ Road safety measures should be considered during design of access roads following standard guidelines. 	

- Considering the targeted number of 2000 out growers with average farm holdings of 2 hectares, requirement for labour was envisaged. The project should have clear, gender, child labour, HIV and COVID management plans.
- Land conflicts have been reported around areas of the proposed project area and these are likely to increase. Caution should be exercised in regard to land ownership issues during enrolment of potential farmers.
- Public health issues such as, HIV, hepatitis and COVID could increase. Strain on existing social services is likely hence advised that NOPP should engage ministry of health to upgrade existing health centres to match expected growth in the population in the project area.
- The project should have and implement alternative activities so as to benefit all community members including those who may not directly participate in oil palm growing. They stressed that the project should have affirmative action for women. Deliberate effort should be made to ensure that women benefit given that majority do not own land
- In regard to the long-term infrastructure plan for the area, the MWT guided that more information could be obtained from Lake Victoria transport (plan) which includes among others opening up landing sites and enhancing development of water transport. Improvement of roads was reported to be routine and often driven by economic activities or politics road. Road upgrade from community access roads to district roads was said to be a gradual with details in sector plans.
- Concerning policy for infrastructure improvement where developments are proposed, MWT said it may not be a matter of policy but government often supports. Currently there is focus on interconnecting area that present potential for tourism and industrial parks.
- Road maintenance was reported to be a challenge to districts although the MWT is engaging government to make the road fund independent so that allocation of resources is as and when required. Currently districts are in charge of maintaining their respective roads.
- Emphasised the need for capacity building for people under the project and participating communities about road safety. Ensure that roads are constructed to recommended standard and road furniture is in place. It was pointed out that road safety had many contributors such as state of the road, skill of drivers and condition of vehicle.
- The ministry pledged support in regard to Engineering, road safety and environment aspects.

Minutes for the meeting held with Ministry of Gender Labour and Social Development

Date and place of the meeting.	14/2/2022
Purpose of the meeting	To collect social and environmental input into the proposed oil palm growing project in Masaka Hub
Present	Bizman Derrick, Occupational Safety Officer MGLSD Olivia Namutosi, Sociologist Newplan Peter Kyakwise, Sociologist Newplan
Notes recorded by.	Olivia Namutosi
<u>Key issues raised</u>	
<ul style="list-style-type: none"> ▪ The need for precautionary measures to be taken to safeguard communities against scenarios of Busoga where farmers dedicated all their land to sugar cane growing. ▪ Oil palm takes a lot of time and there is a risk of farmers dedicating land to it and prices go down when there are bumper harvests. 	

- Using Kalangala as a success story may not aid in clearly predicting what could happen on the main land (Masaka Hub) because the former was a fishing community which activity doesn't directly rely on land while the latter is a farming community whose main economic activities (crop farming and animal rearing) are land based.
- Likely influx of workers. Much as the approach will largely target smallholder farmers, extra labour could be required.
- Increased occurrences of child labour although the complexity of separating domestic labour from child labour is likely given that farms shall be owned at family/ household level.
- Consultative meeting should include a labour officer before and during project implementation. Stressed that recommendations in dealing with labour issues should be drafted in consultation with the district labour officer.
- Oil palm growing requires a lot of fertilizer use hence government should be involved in the purchase, transportation, storage and application following chemical handling procedures.
- Concern was expressed about the likelihood of poor storage and use of fertilisers leading to contamination of neighbouring environs.
- Need for proper training of farmers in chemical handling depending on the type of fertilizers they will be handling.
- Routine medical check-up of farmers after exposure to chemicals should be planned for and incorporated into the project design. Medical examination should be after a risk assessment to ascertain the level of risk involved.
- A list of chemicals/fertilizers should be shared with the ministry for guidance on what is acceptable following the Rotterdam convention on chemical use.
- Requested for the report for the audit report for Kalangala for purposes of bench marking.
- Quality PPE should be provided for workers on the nuclear farm and its proper use enforced.
- Given that the project will involve lifting of heavy objects, skeletal disorder could be reported. Guidance on safe postures for lifting heavy loads needs to be given by trained personnel.
- Since one of the components is access road construction, a clear traffic management plan should be in place during construction and implementation of the project. Such may include proper signage, flags person, speed limit signs proper loading and off-loading procedures in place and defensive driving training for drivers.
- If available, an audit report for Kalangala be availed for reference.

Meeting held with NEMA

Date and place of the meeting.	18/2/2022
Purpose of the meeting	To collect social and environmental input into the proposed oil palm growing project in Masaka Hub
Present	Dr. Jerome Lugumira Olivia Namutosi, Sociologist Newplan
Notes recorded by.	Olivia Namutosi
<u>Key issues raised</u>	
<ul style="list-style-type: none"> ▪ According to information available to the institution, part of the proposed project area (Sango Bay) is an area of high conservation value hence a no-go area adding that this information should have been obtained from district officials during project design. ▪ The process of project area identification did not involve main stakeholders such as NFA, NEMA and the respective districts. ▪ Significant sites of conservation importance such as Nabugabo, Kagyera and Sango Bay were mapped out and boundaries shared with international bodies in 2019. He 	

noted that the ECOP project encroached on demarcated Ramsar sites, which caused adjustments in the boundaries to accommodate the project. The ministry of Water and Environment was accused of not offering sufficient guidance in that regard hence NEMA is very critical and will require detailed maps of the project area to ascertain that no area of conservation interest is affected.

- It was noted that much of Sango Bay area has sandy soils, which may not support oil palm growing. NOPP should seek guidance from NARO.
- Mention was made of 89% of the proposed project area being wetland. Following the presidential directive of reclamation and conservation of swamps, NEMA will be cautious about areas considered for the project.
- A suitability assessment should be conducted for the proposed area.
- In regard to the alternative livelihood enterprises proposed by the project to ensure that even those who may not be able to directly participate in oil palm benefit, NOPP was advised to align their proposals with current government efforts to alleviate poverty such as EMYOGA and Parish model to avoid duplication.
- He advised the project area or PAPs should be identified during the ESIA, but rather NOPP should clearly point out target areas before the detailed study is undertaken.
- All possible efforts are being made to restore Sango Bay therefore projects that are likely to compromise these efforts may not be supported by the authority.
- The smallholder approach could increase vulnerability by members dedicating most of their land to oil palm growing yet it takes long to mature.
- The authority pointed out that a portion of the proposed project area in Bulingo Village Kalungu has been licenced for sand mining hence should not be included.
- Advised that government should acquire land in areas away from sensitive ecosystems and establish nucleus estates because these are easier to centrally manage and monitor in terms of environmental compliance compared to smallholder farmers who would be scattered across all the three proposed districts.

Meeting held with Kalungu District

date and place of the meeting	28/2/2022, Boardroom
Purpose of the meeting	To collect social and environmental input into the proposed oil palm growing project in Masaka Hub
Notes recorded by	Marion Akiteng
<u>Key issues raised</u>	
<ul style="list-style-type: none"> ▪ The outstanding concern expressed was how to convince farmers to move from growing coffee (the known) to palm oil (the unknown). ▪ They noted that environmental degradation in form of wetland reclamation, forest encroachment and fragile ecosystem encroachment was already a challenge in the district hence the proposed oil palm project could worsen the situation. ▪ Areas that are ear marked are currently under food crop growing therefore a clear cost benefit analysis must be done to demonstrate that it is commensurate to change from growing currently grown crops to oil palm ▪ They said it was hard to compare or even expect the Kalangala scenario to be replicated without them knowing exactly how the project has affected populations. They requested for a familiarization tour to Kalanga. ▪ They wanted to know whether the expected beneficiaries had been identified and consulted ▪ District officials wanted to know whether the location for establishment of oil palm nucleus estate had been identified. They were informed that the nucleus is likely to be established in Bukakata ▪ Fear of farmers being scattered all over the area because of the smallholder approach that the project intends to use. Guiding principles for the project should be shared with the district so that they are empowered with correct information about the project. 	

- They noted that the rice growing project in Lwera uses a lot of fertilizers that are washed into the lake and are causing algae blooms. They feared that the proposed oil palm project could worsen the situation since a lot of fertilizer application is also involved.
- The proposed site was said to be a low-lying area that is often flooded during the rainy season.
- District officials advised that farmers be engaged through a beneficiary appraisal so they become more knowledgeable before making any decisions. It was mentioned that income gaps between participating and non-participating households is likely to increase. They said the project should also have alternatives.
- Fear was expressed about the likely loss of biodiversity due to habitat modification.
- Change in land use from known food and cash crops might lead to food insecurity in the area due to dedication of available land to oil palm growing
- They expected to get revenue as a district and also achieve improved standards of living for participating households.
- A conversation ensued to discuss and share the potential sub counties to be targeted. It was agreed that let the three sub counties be considered as part of the project, Bukulula, Lukaya and Rwabenge.
- The district team requested for the Kalangala ESIA report- in response to this, the district team was told that this is a public document and could be found anywhere.
- The DCDO requested the project manager to share principles/ regulations for the oil palm growing.
- There should be plans for biodiversity off sets.
- The district team requested for a joint reconnaissance as a district and consultant team to all Sub Counties.

Consultation meeting with Project Affected Persons (smallholder farmers)



RECORD OF MEETINGS

Project N°:	MAAIF-NOPP/CONS/19-20/00004		
Project Name:	Environmental and Social Impact Assessment for the Proposed Establishment of Oil Palm Plantations in Masaka Hub		
Meeting Ref No:	KAL-SE-RM-2022-07-9	Date of Meeting:	July 9, 2022
Prepared:	Moses Dakasi		
Quality Assured by:	Olivia Namutosi		
Subject:	Stakeholder Engagement		
Venue/ Location of Meeting:	RDC's Residence		
Main category of Stakeholders involved:	List of Attachments <i>Attendance Sheet Lists</i>		
Project Affected Communities			
# Males-10		# Females-1	

Agenda

- 1) Prayer
- 2) Introductions
- 3) Opening Remark-Vice Chairperson
- 4) Presentation-Newplan Limited
- 5) Reactions, Recommendations and Questions
- 6) Closing Remarks-LCI Chairperson

Minute 1: Prayer was led by Mr. Joseph Kalema.

Minute 2: All present introduced themselves.

Minute 3: The Vice Chairperson Local Council One, Mr. Ndawura Robert welcomed all present. He welcomed the project in his village and encouraged community members to embrace it because the project will benefit everyone. Thereafter, he declared the meeting open.

Minute 4: Ms. Olivia Namutosi thanked all for attending the meeting. She informed the meeting that the government has plans to expand the growth of oil palm in the different parts of the county including Masaka Hub which is comprised of Masaka, Kyotera and Kalungu Districts. She informed the meeting that the sub counties in Kalungu District that have been identified were Bukulula, Lwabenge and Lukaya Town Council. Most of the areas identified are close to Lake Victoria.

She informed the meeting that the Government of Uganda had received funding from IFAD to implement the project. The gathering was informed that the project would focus on establishment of oil palm plantations under the smaller holder scheme. Government and the funding agency would provide inputs in form of seedlings, fertilizers and technical advice to farmers in addition to establishing enabling infrastructure such as access roads and stores.

Ms. Olivia informed the meeting that eligible farmers should possess a minimum of 2 hectares (5 acres) of land. Furthermore, she informed the farmers that the oil palm matures between 3-4 years and its lifespan is 25-28 years.

She informed the meeting that the above activities were likely to trigger environmental and social impacts hence the need to conduct an ESIA study whose report would be submitted to NEMA for approval before activities take place. She encouraged eligible and interested farmers to embrace the project and continuously participate in the project activities.

Minute 5: Reactions, Recommendations and Questions are captured in the table below;

No.	Questions	Responsee
1	How many kilograms does each oil palm yield?	▪ This depends on how well the crop is tendered. If well cared for on bunch can be approximately 20-25kg
2	Does the oil palms do well in the wetland?	▪ The ESIA study seeks to guide development that is in line with existing laws and regulations. According to NEMA regulations, wetlands are supposed to be protected hence no farms shall be established in wetlands.
3	How shall inputs pre-financed by government be paid for?	▪ NOPP who are in charge of implementing the project will come and explain the terms exhaustively during registration of potential farmers. usually, an agreed percentage is deducted from a farmer's harvest until the loan advanced in form of inputs is completed.
4	What period does the oil palm take to mature?	▪ Oil palm matures in 3-4 years.
5	Will the project support farmers to clear the land for those that cannot afford?	▪ Farmers interested in the project will be supported through provision of inputs like fertilizers, and seedlings among other benefits.
6	Can farmers with land holdings smaller than 2 hectors participate?	▪ The intention of setting a minimum threshold was to ensure that farmers have some land to continue with other livelihood activities because oil palm takes 3-4 years before maturity
7.	How can farmers be sure that the market prices do not decline if oil palm is produced massively?	▪ Because government is involved the demand for oil palm in the country is big. Setting of oil palm prices is streamlined and every month a new price is set following certain criteria.

Minute 6: The Chairperson Local Council One, Mr. Remegio Kaweesa called upon the farmers to embrace the project. He informed the farmers that the project developers promised to take farmers to Kalangala District for the tour and share ideas and experiences with their counterparts.

Thereafter, he declared the meeting closed.

Consultation meeting in Kikoota A, Bugomola Parish, Lwabenge Sub County



RECORD OF MEETINGS

Project N°:	MAAIF-NOPP/CONS/19-20/00004		
Project Name:	Consultancy Services to Conduct an ESIA for the Proposed Establishment of Oil Palm Plantations in Masaka Hub.		
Meeting Ref No:		Date of Meeting:	9/7/2022
Quality Assured by:	Moses Dakasi, Olivia Namutosi		
Distribution:	Project Manager and Business Unit Manager		
Subject:	ESIA studies for Oil Palm growing in Kalungu District		
Venue/ Location of Meeting:	Kikoota A, Bugomola Parish, Lwabenge Sub County		
Main category of Stakeholders involved	Community/stakeholder engagements		
Agenda <ul style="list-style-type: none">- Prayer- Introduction of the team and community leaders- Brief about the NOPP- Reactions on the project- Closure			
Persons Attending- <ul style="list-style-type: none">▪ Mutete Hope-Parish Chief, Bugomola Parish▪ Vicent Birungi – Botanist, Newplan LTD▪ Freda Akumu – GIS Specialist, Newplan LTD▪ Stephen Kigoolo – Herpetologist, Newplan Limited▪ Percis Namukasa- Project Manager, Newplan Limited▪ Community members from Kikoota A and Bugomola A and B villages			
# Males-		# Females-	

No.	Comments raised	Response
1	If one has less than 2ha, shall I be able to benefit from oil palm project?	Yes, the project targets the rural poor with at least 1ha but not more than 2ha, though adequate land is needed for food crop farming for food security
2	What if I have permanent and perennial crops like bananas and coffee, can I intercrop with oil palm trees?	Intercropping with oil palm trees is only viable for the first 2-3 years after establishment. Only annual/seasonal crops can only be planted between strips of the oil palm trees.
3	Is palm oil only restricted to the shoreline and wetland areas only or even the other sites on the mainland?	No, palm oil grows everywhere as long as the soil and climate conditions favour it. Kalungu district as part of Masaka hub was found suitable for oil palm, but further, soil sampling will be done on individual smallholder farms for this confirmation A buffer of 200m will be left off the shoreline of Lake Victoria, and other areas of HCVs like Katonga wetland and marshlands within the individual farmlands for biodiversity conservation. Marshlands will not be planted with oil palm trees and will be monitored to avoid degradation over time during project implementation.
4	When adopted and at harvest, will there be a factory for processing in Kalungu district or all the ffbs will be ferried to Kalangala oil mill?	Yes, however, for the first phase of project implementation, all ffbs from Kalungu and Masaka districts will be felled to Kalangala oil mill A site in Nakigga-Bukakata sub county, Masaka district has been proposed for oil mill establishment for this matter
5	On the issue of climate variability and change, Kalungu district is affected by this change, will MAAIF support smallholders with irrigation systems for oil palm growth in the early years of establishment?	It is anticipated that oil palm trees, once established, can withstand long drought spells and other weather extreme events, So, the ministry will not support any smallholder with irrigation systems of whatever kind on their oil palm plantations
6	Will there be brokers for transporting ffbs to oil mill for processing?	No, farmers will be tasked to deliver their ffbs to the oil mill individually, however, farmers through associations and the oil palm grower trusts (OPGT) will transport their ffbs in a collective manner to cut transport costs and maximize revenues after.
7	If farmers form SACCOs, will government support us through loans and other services for oil palm?	Yes, the current NOPP is supporting smallholders through a loan from IFAD and private partnerships, the aim is to raise incomes of the rural poor Other support, through the oil palm grower trusts (OPGTs) will include extension services, access

No.	Comments raised	Response
		and farm roads construction, information on prices and ffbs quality among others
8	In Kikoota A village, most households have less than 1 ha of land size, is it advisable for me to do oil palm growing? There are community members with large chunks of land but are cattle keepers, plan on engaging them for this NOPP	More stakeholder engagements shall be undertaken by the MAAIF and Kalungu local government on land availability in areas of Biteebe, Bugomola A, Bugomola B, Buwanda, Kagongero, Kalumaga, Kibisi Kigajjo, Kisamba-Bukiri, Kityaba, Lwamanyonyi, Lwengo and Nanseko, Serinya, Ssala B

Appendix 3: List of small holders' farms in Kalungu District

SN	District	Subcounty	Parish	Village	X	Y	Observations, features, landmark	Notes
1	Kalungu	Bukulula	Mukoko	Kalangala	375343	9977052	Namazzi Aisha-Small Holder Farmer	Kalangala Village
	Kalungu	Bukulula	Mukoko	Kalangala	375363	9976985		Kalangala Village
	Kalungu	Bukulula	Mukoko	Kalangala	375395	9976999		Kalangala Village
	Kalungu	Bukulula	Mukoko	Kalangala	375378	9977055		Kalangala Village
2	Kalungu	Bukulula	Mukoko	Kalangala	375386	9977079	Nabaliisa-Small Holder Farmer	Kalangala Village
	Kalungu	Bukulula	Mukoko	Kalangala	375384	9977077		Kalangala Village
	Kalungu	Bukulula	Mukoko	Kalangala	375385	9977074		Kalangala Village
3	Kalungu	Bukulula	Mukoko	Kalangala	376189	9977300	Michael Muhinda-Small Holder Farmer	Kalangala Village
	Kalungu	Bukulula	Mukoko	Kalangala	376197	9977280		Kalangala Village
	Kalungu	Bukulula	Mukoko	Kalangala	376230	9977288		Kalangala Village
	Kalungu	Bukulula	Mukoko	Kalangala	376225	9977321		Kalangala Village
4	Kalungu	Bukulula	Mukoko	Kalangala	376634	9977533	Charles Sserwanja-Small Holder Farmer	Kalangala Village
	Kalungu	Bukulula	Mukoko	Kalangala	376653	9977545		Kalangala Village
	Kalungu	Bukulula	Mukoko	Kalangala	376650	9977575		Kalangala Village
	Kalungu	Bukulula	Mukoko	Kalangala	376633	9977577		Kalangala Village
5	Kalungu	Bukulula	Mukoko	Kalangala	377046	9978682	Remegio Kaweesi-Small Holder Farmer/Chairperson	Kalangala Village
	Kalungu	Bukulula	Mukoko	Kalangala	377096	9978646		Kalangala Village
	Kalungu	Bukulula	Mukoko	Kalangala	377099	9978614		Kalangala Village
	Kalungu	Bukulula	Mukoko	Kalangala	377123	9978618		Kalangala Village
6	Kalungu	Bukulula	Mukoko	Kalangala	377125	9978611	Kimera Godfrey-Small Holder Farmer	Kalangala Village
	Kalungu	Bukulula	Mukoko	Kalangala	377114	9978608		Kalangala Village
	Kalungu	Bukulula	Mukoko	Kalangala	377115	9978570		Kalangala Village
7	Kalungu	Bukulula	Mukoko	Kalangala	377107	9778559	Ponsiano Ssendi-Small Holder Farmer	Kalangala Village
	Kalungu	Bukulula	Mukoko	Kalangala	377086	9978541		Kalangala Village
8	Kalungu	Bukulula	Mukoko	Kalangala				Kalangala Village

	Kalungu	Bukulula	Mukoko	Kalangala			Yiiga George-Small Holder Farmer	Kalangala Village
	Kalungu	Bukulula	Mukoko	Kalangala	374965	9976477		Kalangala Village
	Kalungu	Bukulula	Mukoko	Kalangala	375074	9977005		Kalangala Village
	Kalungu	Bukulula	Mukoko	Kalangala	374820	9976928		Kalangala Village
9	Kalungu	Bukulula	Mukoko	Kalangala	375627	9977152	Ssenoga Rachael-Small Holder Farmer	Kalangala Village
	Kalungu	Bukulula	Mukoko	Kalangala	375722	9976863		Kalangala Village
	Kalungu	Bukulula	Mukoko	Kalangala	375900	9976932		Kalangala Village
10	Kalungu	Bukulula	Mukoko	Kalangala	376119	9977291	Muyinda-Small Holder Farmer	Kalangala Village
	Kalungu	Bukulula	Mukoko	Kalangala	376136	9977188		Kalangala Village
	Kalungu	Bukulula	Mukoko	Kalangala	376236	9977213		Kalangala Village
	Kalungu	Bukulula	Mukoko	Kalangala				Kalangala Village
11	Kalungu	Bukulula	Bugonza	Kasamba	374420	9976605	Borehole	Donated by HDCC Charity Organisation
12	Kalungu	Bukulula	Bugonza	Kasamba	374428	9976587	Bugonzi local forest reserve	Eucalyptus
13	Kalungu	Bukulula	Mukoko	Kalangala	375055	9979026	Lule Ssenkungo MTN-Small Holder Farmer/RDC	Maize, Cassava, Banana, Mango trees, Jackfruit trees, shrubs
	Kalungu	Bukulula	Mukoko	Kalangala	375044	9979099		
	Kalungu	Bukulula	Mukoko	Kalangala	375108	9979111		
	Kalungu	Bukulula	Mukoko	Kalangala	375115	9979156		
14	Kalungu	Bukulula	Mukoko	Kalangala	375758	9978247	Munisuli-Small Holder Farmer	Sweet potatoes, shrubs
	Kalungu	Bukulula	Mukoko	Kalangala	375888	9978198		
	Kalungu	Bukulula	Mukoko	Kalangala	375908	9978291		
	Kalungu	Bukulula	Mukoko	Kalangala	375765	9978308		
15	Kalungu	Bukulula	Mukoko	Kalangala	375717	9978262	Lwasa John-Small Holder Farmer	Shrubs and Bush
	Kalungu	Bukulula	Mukoko	Kalangala	375726	9978312		

	Kalungu	Bukulula	Mukoko	Kalangala	375623	9978309		
	Kalungu	Bukulula	Mukoko	Kalangala	375623	9978273		
16	Kalungu	Bukulula	Mukoko	Kalangala	376664	9979596	Badiru Kakooza-Small Holder Farmer	Sweet potatoes
	Kalungu	Bukulula	Mukoko	Kalangala	376516	9979640		
	Kalungu	Bukulula	Mukoko	Kalangala	376500	9979628		
	Kalungu	Bukulula	Mukoko	Kalangala	376507	9979570		
	Kalungu	Bukulula	Mukoko	Kalangala	376495	9979465		
17	Kalungu	Bukulula	Mukoko	Kalangala	376370	9979574	Tomusange Ibrahim-Small Holder Farmer	Sweet potatoes, coffee, water melon
	Kalungu	Bukulula	Mukoko	Kalangala	376313	9979567		
	Kalungu	Bukulula	Mukoko	Kalangala	376315	9979544		
	Kalungu	Bukulula	Mukoko	Kalangala	376238	9979512		
	Kalungu	Bukulula	Mukoko	Kalangala	376191	9979300		
	Kalungu	Bukulula	Mukoko	Kalangala	376278	9979279		
18	Kalungu	Bukulula	Mukoko	Kalangala	377057	9979650	Ndawula Robert-Small Holder Farmer	Cassava, Eucalyptus, Coffee, Bush
	Kalungu	Bukulula	Mukoko	Kalangala	377030	9979572		
	Kalungu	Bukulula	Mukoko	Kalangala	377065	9979555		
	Kalungu	Bukulula	Mukoko	Kalangala	377055	9979532		
	Kalungu	Bukulula	Mukoko	Kalangala	377071	9979522		
	Kalungu	Bukulula	Mukoko	Kalangala	377073	9979513		
	Kalungu	Bukulula	Mukoko	Kalangala	377118	9979522		
	Kalungu	Bukulula	Mukoko	Kalangala	377136	9979615		
19	Kalungu	Bukulula	Mukoko	Kalangala	377136	9979615	Sendagire Cosma-Small Holder Farmer	Palm trees, Bush
	Kalungu	Bukulula	Mukoko	Kalangala	377127	9979558		
	Kalungu	Bukulula	Mukoko	Kalangala	377173	9979547		
	Kalungu	Bukulula	Mukoko	Kalangala	377179	9979558		

	Kalungu	Bukulula	Mukoko	Kalangala	377225	9979552		
	Kalungu	Bukulula	Mukoko	Kalangala	377232	9979574		
20	Kalungu	Bukulula	Mukoko	Kalangala	377232	9979574	Sendagire Cosmas- Small Holder Farmer	Bush
	Kalungu	Bukulula	Mukoko	Kalangala	377225	9979552		
21	Kalungu	Bukulula	Mukoko	Kalangala	374529	9978822	Pr. Kiragwa Alozious- Small Holder Farmer	Palm trees, Bush, Sweet potatoes
	Kalungu	Bukulula	Mukoko	Kalangala	374561	9978904		
	Kalungu	Bukulula	Mukoko	Kalangala	374633	9978846		
	Kalungu	Bukulula	Mukoko	Kalangala	374595	9978786		
22	Kalungu	Bukulula	Mukoko	Bugonzi	376612	9979711	Seif Ssekasamba-Small Holder Farmer	Coffee, passion fruit sheds and farm paddocks
	Kalungu	Bukulula	Mukoko	Bugonzi	376598	9979710		
	Kalungu	Bukulula	Mukoko	Bugonzi	376584	9979772		
	Kalungu	Bukulula	Mukoko	Bugonzi	376705	9979747		
23	Kalungu	Bukulula	Mukoko	Bugonzi	376020	9979432	Kawuki Badru-Small Holder Farmer	grass and shrubs
	Kalungu	Bukulula	Mukoko	Bugonzi	375958	9979426		
	Kalungu	Bukulula	Mukoko	Bugonzi	375974	9979485		
	Kalungu	Bukulula	Mukoko	Bugonzi	376023	9979519		
24	Kalungu	Bukulula	Mukoko	Kalangala, Kasasa, Bugonzi	375688	9980468	Access Road	
	Kalungu	Bukulula	Mukoko	Kalangala, Kasasa, Bugonzi	374859	9978499		
	Kalungu	Bukulula	Mukoko	Kalangala, Kasasa, Bugonzi	374823	9978406		
	Kalungu	Bukulula	Mukoko	Kalangala, Kasasa, Bugonzi	374640	9978681		

	Kalungu	Bukulula	Mukoko	Kalangala, Kasasa, Bugonzi	376456	9977388		
25	Kalungu	Bukulula	Mukoko	Kalangala	375625	9978169	Joseph Kalema-Small Holder Farmer	Coffee, Eucalyptus
	Kalungu	Bukulula	Mukoko	Kalangala	375666	9978170		
	Kalungu	Bukulula	Mukoko	Kalangala	375684	9978163		
	Kalungu	Bukulula	Mukoko	Kalangala	375583	9978199		
26	Kalungu	Bukulula	Mukoko	Bugonzi	376577	9979803	Namujjilirwa Juma- Small Holder Farmer	bushland
	Kalungu	Bukulula	Mukoko	Bugonzi	376568	9979833		
	Kalungu	Bukulula	Mukoko	Bugonzi	376628	9979853		
	Kalungu	Bukulula	Mukoko	Bugonzi	376678	9979858		
27	Kalungu	Bukulula	Mukoko	Kalangala	377142	9979358	Badru Kateregga-Small Holder Farmer	Water melon, Eucalyptus
	Kalungu	Bukulula	Mukoko	Kalangala	377167	9979389		
	Kalungu	Bukulula	Mukoko	Kalangala	377193	9979392		
	Kalungu	Bukulula	Mukoko	Kalangala	377199	9979349		
28	Kalungu	Bukulula	Mukoko	Kalangala	377353	9979119	Cosma Ssendagire- Small Holder Farmer	Open farmland
	Kalungu	Bukulula	Mukoko	Kalangala	377340	9979053		
	Kalungu	Bukulula	Mukoko	Kalangala	377339	9979109		
	Kalungu	Bukulula	Mukoko	Kalangala	377349	9979091		
29	Kalungu	Bukulula	Mukoko	Kalangala	377325	9978815	Kimera Godfrey-Small Holder Farmer	Sweet potatoes
	Kalungu	Bukulula	Mukoko	Kalangala	377279	9978799		
	Kalungu	Bukulula	Mukoko	Kalangala	377289	9978746		
	Kalungu	Bukulula	Mukoko	Kalangala	377288	9978713		
30	Kalungu	Bukulula	Mukoko	Kalangala	377281	9978712	Agnes Nalumansi-Small Holder Farmer	Sweet potatoes
	Kalungu	Bukulula	Mukoko	Kalangala	377283	9978744		
	Kalungu	Bukulula	Mukoko	Kalangala	377177	9978741		
	Kalungu	Bukulula	Mukoko	Kalangala	377158	9978653		
31	Kalungu	Bukulula	Mukoko	Kalangala	376882	9978390		Water melon

	Kalungu	Bukulula	Mukoko	Kalangala	376982	9978362	Kayanja-Small Holder Farmer	
	Kalungu	Bukulula	Mukoko	Kalangala	376999	9978396		
	Kalungu	Bukulula	Mukoko	Kalangala	376884	9978426		
	Kalungu	Bukulula	Mukoko	Kalangala	377095	9978349	Ponny Namuwawu-Small Holder Farmer	Trees
	Kalungu	Bukulula	Mukoko	Kalangala	377175	9978390		
	Kalungu	Bukulula	Mukoko	Kalangala	377174	9978447		
	Kalungu	Bukulula	Mukoko	Kalangala	377103	9978431		
32	Kalungu	Bukulula	Mukoko	Kalangala	376953	9977854	Muyanja Charles-Small Holder Farmer	Coffee, sweet potatoes
	Kalungu	Bukulula	Mukoko	Kalangala	376898	9977908		
	Kalungu	Bukulula	Mukoko	Kalangala	376856	9977818		
	Kalungu	Bukulula	Mukoko	Kalangala	376938	9977846		
33	Kalungu	Bukulula	Mukoko	Kalangala	328840	9977651	Sekagiri-Small Holder Farmer	Tomatoes
	Kalungu	Bukulula	Mukoko	Kalangala	375959	9977650		
	Kalungu	Bukulula	Mukoko	Kalangala	375987	9977652		
34	Masaka	Buwunga	Kanywa	Bukeeri	364462	9950873	Mazzi Jimmy-Small Holder Farmer/Chairperson	Trees, shrubs
	Masaka	Buwunga	Kanywa	Bukeeri	364363	9950714		
	Masaka	Buwunga	Kanywa	Bukeeri	364474	9950697		
	Masaka	Buwunga	Kanywa	Bukeeri	364215	9950814		
35	Masaka	Buwunga	Kanywa	Bukeeri	363239	9950302	Ssenyonga Experoto-Small Holder Farmer	Sweet potatoes, Cassava, Coffee, Mango trees
	Masaka	Buwunga	Kanywa	Bukeeri	363255	9950292		
	Masaka	Buwunga	Kanywa	Bukeeri	363242	9950267		
	Masaka	Buwunga	Kanywa	Bukeeri	363264	9950248		
	Masaka	Buwunga	Kanywa	Bukeeri	363223	9950214		
	Masaka	Buwunga	Kanywa	Bukeeri	363196	9950236		

Appendix 4: Stakeholder Attendance lists in Kalungu District

Consultation with MAAIF Team-NOPP

ATTENDANCE SHEET

PARTICIPANTS REGISTRATION FORM

MINISTRY OF AGRICULTURE, ANIMAL INDUSTRY AND FISHERIES

NATIONAL OIL PALM PROJECT

SUBJECT: CONSULTATIVE MEETING NAKAKA HUB DATE: 8th / 2 / 2022 LOCATION: NOPP BOUNDARY

#	Name	Gender (M/F)	Age A = Adult; Y = Youth (18-30 years)	Institution/group	Title	Telephone	Signature
1	Olivia Namutosi	F	A	Newplan	Sociologist	076949098	
2	Benyamen Maraka	M	A	NOPP	EA	0777197123	
3	Robert Charles Aguma	M	A	NOPP	EHSO	0772380340	
4	Oforio Lurley	M	A	OPUL	EHS	0776260316	
5	Emmanuel Mukama	M	A	NOPP	MEL	072374516	
6	Gavie Mogamu Masaka	F	A	NOPP-MAAF	PM	0772475713	
7	Peter Kyakwise	M	A	NOPP	Sociologist	0773288455	
#	Name	Gender (M/F)	Age	Institution/group	Title	Telephone	Signature

Consultation with Kalungu District Leaders




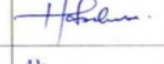
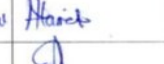



ATTENDANCE REGISTER

Date:	<u>14th / 2 / 2022</u>	Venue:	<u>MAHSA.</u>
Meeting Title:	<u>Oil Palm growing in Nakaka Hub</u>		

Name and Surname	Representing (i.e. Ministry, Dept., Company)	Designation / Position	Contact Information	Signature
BIZMAN DERRIC	MAHSA DOH	Occupational Safety Officer	Telephone: 0704421401 Email: derrickbizman@gmail.com	
Peter Kyakwise	Newplan	Sociologist	Telephone: 0773288452 Email: peter.kyakwise@newplan	
Olivia Namutosi	Newplan	Sociologist	Telephone: 076949098 Email: namutosiolivia@gmail.com	
			Telephone: Email:	

ATTENDANCE REGISTER

Date:	28 th - 02 - 2022	Venue:	Kalungu District
Meeting Title:	Stakeholder meeting		

No.	Name and Surname	Representing (i.e. Division)	Designation / Position	Contact Information	Signature
1	Byangwa Daniel	Kalungu district	District Fisheries Officer	Telephone: 0703710600 Email: dfo.kalungu@gmail.com	
2	Dr. Simbwa Henry	Kalungu DCA	District vet officer / DPMO	Telephone: 0752314395 Email: ssimbwaahenry@gmail.com	
3	Makwanya Horat	Kalungu DCA	SCDO	Telephone: 0700371756 Email: Lmakwanya@4@gmail.com	
4	Sengula Amos	Kalungu DCA	Forestry Officer	Telephone: 0702688994 Email: asengula@gmail.com	
5	Vube Richard	Kalungu DCA	Senior Environment Officer	Telephone: 0702328118 Email: richard.vube@gmail.com	
6	Munyula Majura	SAS/Kalungu DCA	SAS	Telephone: 0703481056 Email: munyulamajura@gmail.com	

Consultation with Local communities in Kalungu District

Kikomola Village, Bugomola Parish, Lwabenge Sub-County, Kalungu District



ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
FOR THE PROPOSED ESTABLISHMENT OF OIL PALM
PLANTATIONS IN MASAKA HUB

ATTENDANCE REGISTER

Kalungu District
Lwabenge Subcounty

Date:	09/7/2022	Venue:	Kikomola Village - Bugomola Parish
Meeting Title:	Stakeholder Engagements for ESIA for oil palm growing in Kalungu District		
Starting Time:	3:13 PM	End Time:	4:10 PM
Name of Meeting Organiser	Vicente Brings	Signature of Meeting Organiser	EA

Name and Surname	Representing (i.e. Ministry, Dept., Company)	Designation / Position	Contact Information	Signature
Weslwa Mubiki	Kikoota	omurimi	Telephone: Email: 0753013737	
Srenakula Hony	Kikoota	Musibuzi	Telephone: Email: 0753549310	
Nantale Harict	Kikoota	muhimi	Telephone: Email: 0758627436	
SSEKI 20E	KIKOOTA	JOEAB	Telephone: Email: 0755287200	SSEKI 20E
Nabutono Getunde	Kikoota		Telephone: Email: 0751887649	Nabutono

Kikoota Village, Bugomola Parish, Lwabenge Sub-County, Kalungu District



ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
FOR THE PROPOSED ESTABLISHMENT OF OIL PALM
PLANTATIONS IN MASAKA HUB

ATTENDANCE REGISTER

Kalungu District
Lwabenge Subcounty

Date:	09/7/2022	Venue:	Kikoota Village - Bugomola Parish, Lwabenge Subcounty
Meeting Title:	Stakeholder Engagements for ESIA for oil palm plantations in Kalungu District		
Starting Time:	03:13 Pm	End Time:	4:10 Pm
Name of Meeting Organiser	Vicent Binungi	Signature of Meeting Organiser	EA

Name and Surname	Representing (i.e. Ministry, Dept., Company)	Designation / Position	Contact Information	Signature
Muzimira Samuel	Kikoota LC	Peasant	Telephone: 0789534411 Email: Muzimirasamuel@gmail.com	Samuel
Isemanda Richard	Kikoota LC	Peasant	Telephone: 0751970567 Email:	Isemanda
KIWIZWA LAWRENCE	Kikoota LC	Peasant	Telephone: Email: 0704775276	Lawrence
Mugalelia Dore	Kikoota LC		Telephone: Email: 0754197204	
Belongolujumandira B. Kikoota	Chairperson LC	Peasant	Telephone: 0758452262 Email: 07581159269	Belongolujumandira

Kalungu District
Lwabanga Subcounty

ATTENDANCE REGISTER

Date:	09/7/2022	Venue:	Kikosta Village - Bugomata Parish
Meeting Title:	Stakeholder Engagement for ESIA		Lwabanga Subcounty
Starting Time:	3:13 PM	End Time:	4:10 PM
Name of Meeting Organiser	Vicent Brungi	Signature of Meeting Organiser	[Signature]

Name and Surname	Representing (i.e. Ministry, Dept., Company)	Designation / Position	Contact Information	Signature
Ngirani Ezaj			Telephone: Email: 075153335	
Namagembe	Mikiyati		Telephone: Email: 0755806741	
Hambirige	Jaan		Telephone: Email: 0758842804	
Nantume Githi			Telephone: Email: 0704516438	
NABISEKE GLOLA			Telephone: Email: 0706421738	

ATTENDANCE REGISTER

Date:	9th July 2022	Venue:	Lwabanga Parish Kikosta Village
Meeting Title:	Village Stakeholder Engagement on ESIA Palm oil growing in Kalungu District		
Starting Time:	3:00	End Time:	4:00 PM
Name of Meeting Organiser	VINCENT BRUNGI	Signature of Meeting Organiser	[Signature]

Name and Surname	Representing (i.e. Ministry, Dept., Company)	Designation / Position	Contact Information	Signature
Percis Namukasa	NEWPLAN LIMITED	PROJECT MANAGER	Telephone: 0783582279 Email: percis@newplan-group.com	[Signature]
MATIAU BETIER M	"		Telephone: 075522821 Email:	[Signature]
Tobitandwa Ganza	"		Telephone: 0754691420 Email:	[Signature]
Mutesasira Sumu	"		Telephone: 0759298228 Email:	
Mugera Livingstone			Telephone: 0709829680 Email:	

ATTENDANCE REGISTER

Kalungu District
- Luwero Sub-county

Date:	09/7/2022	Venue:	Kikoota village - Bugomela Parish
Meeting Title:	Stakeholder Engagements for EIA for oil palm growing in Kalungu District		
Starting Time:	3:13 PM	End Time:	4:10 PM
Name of Meeting Organiser	Vicent Biringi	Signature of Meeting Organiser	BA

Name and Surname	Representing (i.e. Ministry, Dept., Company)	Designation / Position	Contact Information	Signature
Malule Hadjiah	Kikoota	citizen	Telephone: Email: 0751521149	Malule
Kayitane Ari	Kikoota	—	Telephone: Email: 0761361161	Ari
Muligande Vicent	Kikoota	citizen	Telephone: 0741956681 Email:	Muligande

ATTENDANCE REGISTER

KALUNGU DISTRICT
Luwero Sub-county

Date:	09/7/2022	Venue:	Kikoota village, Bugomela Parish, Luwero DC
Meeting Title:	Stakeholder Engagements for EIA for oil palm plantations in Kalungu District		
Starting Time:	03:13 PM	End Time:	4:10 PM
Name of Meeting Organiser	Vicent Biringi	Signature of Meeting Organiser	BA

Name and Surname	Representing (i.e. Ministry, Dept., Company)	Designation / Position	Contact Information	Signature
Vicent Biringi	NewPlan LTD	Botanist	Telephone: 0783750089 Email: Vincent.biringi@newplanltd.com	BA
MUTETERI HOPE	Luwero Sub-county	1 Bugomela Parish chief	Telephone: 0751147865 Email: muteterihope244@gmail.com	Muteteri
Ssalongo Stephen Kigoolo	New Plan Ltd	Farmer Ecologist	Telephone: 0772624274 Email: ssalongo@gmail.com	Ssalongo
HAKAMBA ZIMBA	Sub county	Citizen	Telephone: Email: —	
N.SIMBI RONALD	Sub county	PEASANT	Telephone: Email: 07892237199	Nsimbi

Engagement with Kalangala Village



ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
FOR THE PROPOSED ESTABLISHMENT OF OIL PALM
PLANTATIONS IN MASAKA HUB

ATTENDANCE REGISTER

Karungu District
Kalangala Village

Date:	9/07/2022	Venue:	RDC's Residence
Meeting Title:	Stakeholder Engagement - Kalangala Village		
Starting Time:	3:20 pm	End Time:	4:40 pm
Name of Meeting Organiser	Newplan Limited	Signature of Meeting Organiser	OS

Name and Surname	Representing (i.e. Ministry, Dept., Company)	Designation / Position	Contact Information	Signature
Kigenba	Joseph	Farmer	Telephone: Email: 0753927035	Kigenba
Badru Kaula		Farmer	Telephone: Email: 072623467	Kaula B.
Kimera Godfrey		Farmer	Telephone: Email: 0751666521	Kimera
Lumba	John	Farmer	Telephone: Email: 0773443870	Lumba
			Telephone: Email:	



ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
FOR THE PROPOSED ESTABLISHMENT OF OIL PALM
PLANTATIONS IN MASAKA HUB

ATTENDANCE REGISTER

Karungu District
Kalangala Village

Date:	9/07/2022	Venue:	RDC's Residence
Meeting Title:	Stakeholder Engagement - Kalangala Village		
Starting Time:	3:20 pm	End Time:	4:40 pm
Name of Meeting Organiser	Newplan Limited	Signature of Meeting Organiser	OS

Name and Surname	Representing (i.e. Ministry, Dept., Company)	Designation / Position	Contact Information	Signature
Dakisi Moses	Newplan	Stakeholder	Telephone: 0774408608 Email:	OS
KALEMA JOSEPH	KALANGALA	FARMER	Telephone: 0703568546 Email:	JOSEPH
NDAWU ROBERT	KALANGALA	FARMER	Telephone: 0774393965 Email:	ndawu
Benegio Kawera	Kalangala	Farmer	Telephone: 6779270822 Email:	Kawera
badili	Kalangala	FARMER	Telephone: 0785744444 Email:	badili

ATTENDANCE REGISTER

Kalungu District
Basis / Bugwari

Date:	14/7/2022	Venue:	John Mute's Residence
Meeting Title:	Stakeholder Engagement for ESIA on Palm Project		
Starting Time:	10:30	End Time:	
Name of Meeting Organiser	Newplan Limited	Signature of Meeting Organiser	DS

Name and Surname	Representing (i.e. Ministry, Dept., Company)	Designation / Position	Contact Information	Signature
Dakasi Moses	Newplan	Sociologist	Telephone: 0774408608 Email:	DS
Moses Seebagale	Newplan	Agronomist	Telephone: 077-509530 Email:	DS
Muwonge Abdul	Bugwari LG	Teacher	Telephone: 0701-335185 Email: abdulmuwonge@gmail.com	DS
Matoru John	Bugwari LG	Businessman	Telephone: 0704-101196 Email:	Matoru John
Ndandanya Immanuel	Bugwari LG	Teacher	Telephone: 0702828606 Email:	DS

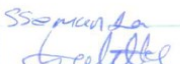






ATTENDANCE REGISTER

Kalungu District
Basis / Bugwari

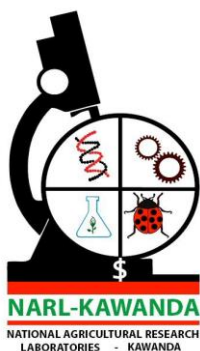
Date:	14/7/2022	Venue:	John Mute's Residence
Meeting Title:	Stakeholder Engagement for ESIA on Palm Project		
Starting Time:	10:30	End Time:	
Name of Meeting Organiser	Newplan Limited	Signature of Meeting Organiser	DS

Name and Surname	Representing (i.e. Ministry, Dept., Company)	Designation / Position	Contact Information	Signature
GEORGE W. BAKA	Baka	Farmer	Telephone: 0703891299 Email:	George
Ssali Kalid	Bugwari	Mulimi	Telephone: 0774695316 Email:	Ssali
Ssekiboko Ssamen Nabisa	Bugwari	Mulimi	Telephone: 0778535040 Email:	SS
Male John Sekumanya	Bugwari	Farmer	Telephone: 0700596945 Email: malesekumanya@gmail.com	Male

Community meetings in Kyesiga Sub-County

SN	NAME	SEX	TEL NO	VILLAGE	SIGNATURE
	ISABIRYE YASIN	M	0753209861	Lwemodde	
	SSemanda VICENT	M	0709199044	Lwemodde	
	BALITTA GOSFREY	M	0755474543	Lwemodde	
	NAJJUMA PROSSY	F	07582411271	LWEMODDE	
	Kakooza Chafwa	M	0740847832	MAGIRI	
	NAKITENDE, TEDDY	F	0701650269	KABANDA	
	MBAZATIREKI FLO	F	0705181788	KABANDA	
	SEMAMBA ROBERT	M	0753058939	KABANDA	
	Wasswa Richard	M	075745108	Kikonda	
	Senkumba John	M	0750070241	Kirimbula	
	MUCHEMBA Joseph	M	0707741354	Bbunyuma	
	NDIKUGENDAWA MAGIS	M	0707741265	Bbunyuma	
	Lwansa J.B TEESI	M	0750984295	Iyesuna	
	SSEKIBI ISWA	M	0753742960	Bbukurile	
	SSEBUKUFU ROBERT	M	0788577711	BAMUNANIKI	
	NAMPUUGA Regina	F	0757817950	HABITAKA	
	Bbura Li GUMANA	M	0752370791	Adimo	
	Kyakukwe, John	M	0755926450	ogerze	
	menyanga GELAM	M	0752444489	MAGIRI	
	ITABU RONARD	M	0750419672	GAFAZA	
	KABIITO OTMOS	M	0752974312	Bungolwemodde	
	KIZZA FRESA	M	0776160931	Adimo	
	NAMAGANDA JANE	F	0756405006	Kirambula	
	TUMUKUNDE SYLVIA	F	0754572783	KASANGE	
	Makula Gertrude	F	0757496952	Kikonda	
	Namatovu Sharon	F	0740847830	Kyotokoolo	
	LUSIRA MIKIDADI	M	0753261626	LWEMODDE	
	OMUSOBI KIRUMIRE	M	0702886307	BAMUNANIKI	
	SSebadda FRED	M	0752349405	Kirambula	
	KASIGUEWA CH	M		Bbuciro	
	NABASAZZI TEDDY	F	0754897698	Lukola	
	MUTHAWU GOSFRA	M	0755515029	BULIRO	
	Mupere Achelag		0756239826	Kirambula	
	Nhuvake GONGA	M	0702315990	Kajjusa	
	M	0702135478	Lwamulwa	

Appendix 5: Soil Test Results



SOILS Report for SAMPLES FROM NEW PLAN OIL PALM PROJECT

Prepared by

C. Kayuki Kaizzi (PhD)
Principal Research Officer – Soil Scientist
Soils, Agro-meteorology and Environment Unit

**NATIONAL AGRICULTURAL RESEARCH LABORATORIES -
KAWANDA**

NATIONAL AGRICULTURAL RESEARCH ORGANISATION (NARO)

9th September 2022

INTRODUCTION

The nature of soils in Uganda

Soils in Uganda are very old and deeply weathered; they have inadequate supply of the major plant nutrients, very low nutrient holding capacity and deficiencies or toxicities of trace elements. The nutrients also are prone to leaching since rainfall is high in many areas. Soils will only yield good crops under good management through the use of organic manures or inorganic fertilizer during the cropping phase, practicing crop rotation, controlling soil erosion through soil and water conservation and resting the land. Soil fertility is associated with soil organic matter because it is a source of plant nutrients, contributes to nutrient retention, and ensures good soil physical properties necessary for rainfall infiltration, proper soil aeration, plant root penetration, structural stability and soil water retention. Soil organic matter is found in the top 20 cm soil depth and is susceptible to losses through erosion once vegetation cover is removed. If topsoil is lost through erosion, the fertility and productivity of the land are permanently lost. For soils to remain productive they must be properly managed to maintain organic matter at reasonable levels and to keep good soil physical properties.

Soil fertility / health

A fertile / health soil supports plant growth by providing a good physical, biological and chemical environment. The parameters used to assess the fertility status of Uganda soils include soil pH, soil organic matter, available phosphorus (P), texture (sand, clay, silt fractions), extractable calcium (Ca), potassium (K) and magnesium (Mg). Soil pH and organic matter content are the most important soil parameter because pH influences the availability of plant nutrients. Soil organic matter is an important source of plant nutrients and also plays many other important roles, e.g. improving soil physical characteristics, increasing the soil moisture holding capacity and providing a good habitat for soil micro-, meso- and macro-organisms, but also plays an important role in soil-biological processes. The sand fraction in a soil ensures good soil drainage and workability, while the clay fraction ensures that the soil is able to retain soil moisture and plant nutrients.

A fertile or healthy soil should:

- (i) be deep enough without any obstructing layer to enable roots explore a sufficient soil volume
- (ii) have good structure (based on the distribution and aggregation of particles) to ensure proper aeration, hence growth and development of roots
- (iii) have a favourable soil reaction (i.e. degree of acidity and alkalinity pH range 5.5 to 6.5 for most crops
- (iv) have a good supply of both available and reserve plant nutrients
- (v) be able to store soluble nutrients
- (vi) contain sufficient organic matter
- (vii) Support a wide range of micro-, meso- and macro-organism [fauna and flora]

Soil fertility decline

Soil fertility decline in Uganda has risen due to the following:

- (i) nutrient mining [i.e. removing more nutrients from the soil through crop harvest, soil erosion, etc.] than what is replaced through addition of organic and inorganic fertilizers;
- (ii) loss of soil cover by in situ destruction or removal of crop residues;
- (iii) accelerated loss of soil organic matter through in-situ destruction of vegetation, ploughing, burning of crop residues, etc.;
- (iv) poor soil physical properties resulting in low rainfall infiltration and restricted rooting caused by soil compaction, and
- (v) lack of proper soil management.

Organic and inorganic fertilizers

Application of organic and inorganic fertilizers are effective means to reverse soil nutrient depletion and improve land productivity. There is an increasing consensus that mineral fertilizers are essential to counteract declining soil fertility and improve agricultural productivity. Greater use of inorganic fertilizer, supplemented with soil and water conservation and organic nutrient supplementation, is central to realizing the productivity and yield increases required to override the current situation.

METHODOLOGY

Sixtyeight surface soil samples were collected from different districts and delivered to the Soil and Plant Tissue Analytical Laboratory at the National Agricultural Research Laboratories (NARL) – Kawanda, to analyze soil pH, soil organic matter (SOM) (Walkley and Black, 1934), and available P and exchangeable K measured in a single Mehlich-3 extract and buffered at pH 2.5 (Mehlich, 1984)). Soil texture was determined by the hydrometer method (Bouyoucos, 1936). Soil pH was measured using a soil to water ratio of 1:2.5 (Okalebo et al., 2002).

RESULTS

Summary of the soil parameters across the project districts

It is observed from Table 1 that on average 54% of the soil samples had low soil pH. This calls for application of agricultural lime to raise the pH so as to overcome the yield depressing effect of low soil pH because it influences nutrient availability and reactions in the soil. Further over 63% and 85% of the samples had low levels of soil organic matter and available phosphorus, respectively. Soil organic matter is a major source of nutrients in Uganda, this implies that these soils are low in N and P therefore crops growing on these soils will suffer from N and P deficiency resulting in low crop yield. Therefore, application of inorganic N and P fertilizers will be required to increase crop yield. This is in agreement with the known fact that N and P are the most limiting nutrients in soils of Uganda. It is observed that the 100% of the samples had medium levels to high levels of calcium, potassium and magnesium. This implies that crops are not likely to respond to application of Ca, Mg and K. However, farmers should be advised to apply these nutrients for maintenance and replenishment fertilization to avoid their depletion in the soil.

Masaka district

Results presented show that fields had sandy loam, loamy sand, clay loam. loam and sandy clay loam soils and 58% of the soils have low soil organic matter and the rest have average levels. The majority of the soils (79%) have low levels of available phosphorus. Since soil organic matter is the main source of N and P, this implies that N and P are limiting crop production on these fields, hence application of NP fertilizers and organic manure is required to avoid deficiency of these nutrients and to increase crop yield. The soil pH of 63% of the soils is below the low critical value of 5.2 implying soil pH will affect availability of plant nutrients and application of agricultural lime will be required on these soils prevent the negative effect of low soil pH on nutrient availability. The soils have medium to high levels of calcium, magnesium and potassium. However, to avoid depleting soil calcium, magnesium and potassium application of organic and inorganic fertilizer will be required to sustainability and to replenish nutrients removed from the soil as constituent of crop harvest.

Kyotera district

Results presented show that fields had sandy loam, loamy sand, clay loam. loam and sandy clay loam soils and 58% of the soils have low soil organic matter and the rest have average levels. The majority of the soils (75%) have low levels of available phosphorus. Since soil organic matter is the main source of N and P, this implies that N and P are limiting crop production on these fields, hence application of NP fertilizers and organic manure is required to avoid deficiency of these nutrients and to increase crop yield. The soil pH of 58% of the soils is below the low critical value of 5.2 implying soil pH will affect availability of plant nutrients and application of agricultural lime will be required on these soils prevent the negative effect of low soil pH on nutrient availability. The soils have medium to high levels of calcium, magnesium and potassium. However, to avoid depleting soil calcium, magnesium and potassium application of organic and inorganic fertilizer will be required to sustainability and to replenish nutrients removed from the soil as constituent of crop harvest.

Kalungu district

Results presented show that fields had sandy loam and sandy clay loam soils with 69% of the soils have low soil organic matter. Since soil organic matter is the main source of N and P, this implies that N and P are limiting crop production on these fields, hence application of NP fertilizers and organic manure is required to avoid deficiency of these nutrients and to increase crop yield. The soil pH of the 19% of the samples is below the low critical value of 5.2 implying soil pH will affect availability of plant nutrients and application of agricultural lime will be required on these soils. However, application of agricultural lime will not be required for the rest of the soils. The majority of the soils (95%) have low levels of available phosphorus. Application of organic and inorganic fertilizers will be required to prevent plants from suffering from P deficiency. The soils have medium to high levels of calcium, magnesium and potassium. However, to avoid depleting soil calcium, magnesium and potassium application of organic and inorganic fertilizer will be required to sustainability and to replenish nutrients removed from the soil as constituent of crop harvest.

Analytical Lab	Soil and Plant Analytical Laboratories at NARL													
Client:	New Plan c/o Namukasa (445-512)													
District	Masaka, Kyotera, Kalungu													
Village														
Type of Sample	Soil samples													
Date of Analysis	August 22													
Lab No.	Client's Reference				pH	OM	P	Ca	Mg	K	Sand	Clay	Silt	Textural Class
		Village	District	Cord							-----%-----			
S/22/445	A1A1	Bulingo	Kalungu	31.87419	4.8	2.3	6.4	568	240	119	59	20	20	Sandy loam
S/22/446	A2A2	Bulingo	Kalungu	31.85608	6.5	2.0	61.1	1481	232	300	63	16	20	Sandy loam
S/22/448	K1	Kalungi A	Kyotera	31.53891	5.1	1.0	4.8	841	443	73	71	13	15	Sandy loam
S/22/449	K2	Kalungi A	Kyotera	31.53658	5.3	2.3	4.0	850	288	110	59	16	24	Sandy loam
S/22/451	K4	Nakiga	Masaka	31.89376	5.2	3.6	3.3	1062	227	50	87	7	5	Loamy sand
S/22/452	B1-	Kalangala	Kalungu	31.89521	5.2	1.4	8.6	923	500	71	81	9	9	Loamy sand
S/22/454	B3	Kalangala	Kalungu	31.89435	6.7	2.7	10.1	1850	224	503	83	9	7	Loamy sand
S/22/456	C2	Kalangala	Kalungu	31.8929	7.0	3.0	98.9	2480	365	321	81	10	8	Loamy sand
S/22/457	C3	Kalangala	Kalungu	31.89262	6.0	1.3	4.7	1974	354	119	85	8	6	Loamy sand
S/22/459	D2	Kalangala	Kalungu	31.88762	5.4	5.7	14.4	1020	196	196	67	13	19	Sandy loam
S/22/460	D3	Kalangala	Kalungu	31.88775	5.0	6.3	13.1	949	391	118	67	14	18	Sandy loam
S/22/461	E1	Kalangala	Kalungu	31.88134	4.5	6.7	8.1	756	221	134	73	10	16	Sandy loam
S/22/463	E3	Kalangala	Kalungu	31.88142	5.5	8.6	8.9	985	345	327	71	10	18	Sandy loam
S/22/464	P1	Kanamusabala	Masaka		5.8	2.1	3.4	1136	307	92	65	17	17	Sandy loam
S/22/465	P2	Kanamusabala	Masaka		4.9	2.5	2.2	795	503	189	61	18	20	Sandy loam
S/22/468	P5	Kanamusabala	Masaka		4.8	2.4	1.8	696	368	86	53	24	22	Sandy clay loam
S/22/469	P6	Kanamusabala	Masaka		4.6	2.2	1.8	630	329	80	53	24	22	Sandy clay loam
S/22/470	Q1	Emiriyo	Masaka		4.3	7.4	220.3	568	295	56	65	17	17	Sandy loam
S/22/472	Q3	Emiriyo	Masaka		4.4	2.4	79.3	738	323	223	59	19	21	Sandy loam
S/22/473	N1	Kyanamukaka	Masaka	31.72684	7.6	2.8	17.7	3480	530	290	69	15	15	Sandy loam
S/22/475	N3	Kyanamukaka	Masaka	31.72717	7.7	2.3	15.6	3160	676	337	75	12	12	Sandy loam
S/22/477	KK2	Kitiiti	Masaka		4.5	3.3	17.1	975	302	151	39	27	33	Loam
S/22/478	KK3	Kitiiti	Masaka		4.3	2.6	8.1	961	240	140	32	30	38	Loam
S/22/479	Z1	Zzimwe	Masaka		4.6	3.1	9.4	709	277	169	42	29	29	Loam

Lab No.	Client's Reference				pH	OM	P	Ca	Mg	K	Sand	Clay	Silt	Textural Class
		Village	District	Cord							-----%-----			
S/22/480	Z2	Zzimwe	Masaka		4.7	2.6	4.5	1233	286	109	40	30	30	Clay loam
S/22/481	Z3	Zzimwe	Masaka		4.7	3.4	4.7	825	523	98	40	30	30	Clay loam
S/22/483	BB2	Buzinde	Kyotera		4.6	3.0	40.4	675	397	105	52	20	28	Sandy loam
S/22/484	BB3	Buzinde	Kyotera		4.7	2.7	7.0	603	380	101	56	21	23	Sandy clay loam
S/22/486	BB5	Buzinde	Kyotera		4.9	2.3	10.7	785	250	75	70	14	16	Sandy loam
S/22/487	BB6	Buzinde	Kyotera		5.0	2.5	10.0	787	367	150	70	14	16	Sandy loam
S/22/488	J1	Jjengere	Kyotera		4.8	1.3	2.0	901	358	226	38	23	39	Loam
S/22/489	J2	Jjengere	Kyotera		5.8	3.7	19.6	1108	295	364	56	20	24	Sandy loam
S/22/490	J3	Jjengere	Kyotera		5.5	4.2	13.3	1067	284	233	54	18	28	Sandy loam
S/22/493	KK6	Katovu	Kyotera		4.7	1.6	4.4	627	292	112	76	12	12	Loamy sand
S/22/494	KA1	Katikamu	Masaka		4.4	3.3	7.8	508	404	137	46	27	27	Loam
S/22/496	KA3	Katikamu	Masaka		4.4	3.1	10.9	535	247	178	40	30	30	Loam
S/22/498	BK2	Bulonge	Masaka		4.0	1.9	41.2	543	310	85	58	21	21	Sandy clay loam
S/22/499	BK3	Bulonge	Masaka		4.6	2.5	42.6	674	326	212	56	22	22	Sandy clay loam
S/22/500	TC1	Lukaya	Kalungu	31.85467	7.3	2.4	12.1	3727	392	527	72	15	13	Sandy loam
S/22/502	TC3	Lukaya	Kalungu	31.85544	5.4	1.9	3.7	1014	278	154	54	22	24	Sandy clay loam
S/22/504	BK2	Lukaya	Kalungu		5.2	1.4	5.6	968	244	293	58	22	20	Sandy clay loam
S/22/505	BK3	Lukaya	Kalungu		6.0	3.3	15.0	2467	358	262	68	15	17	Sandy loam
S/22/506	BA1	Bukaala	Kyotera		6.9	1.1	11.3	3822	337	395	60	18	22	Sandy loam
S/22/508	BA3	Bukaala	Kyotera		5.9	1.4	4.8	1974	257	135	84	9	7	Loamy sand
S/22/510	Nangoma				5.0	2.2	71.6	680	250	50	90	7	3	Loamy sand
S/22/512	Nangoma				5.2	2.2	12.0	855	358	110	74	13	13	Loamy sand

CATION EXCHANGE CAPACITY (CEC) OF SELECTED SOIL SAMPLES

Is the ability of the soil to hold or store cations. When soil particles are negatively charged, they attract and hold on to cations (positively charged ions) stopping them from being leached as water percolates through the soil. This is important avenue through which nutrients are lost from the soil especially in areas which receive high rainfall. This electrical charge is critical to the supply of nutrients to plants because many nutrients exist as cations (e.g. magnesium, potassium and calcium). In general terms, soils with large quantities of negative charge are more fertile because they retain more cations. Cation exchange capacity (CEC) is a useful indicator of soil fertility because it shows the soil's ability to supply three important plant nutrients: calcium, magnesium and potassium. CEC is an inherent soil characteristic and is difficult to alter significantly. It influences the soil's ability to hold onto essential nutrients and provides a buffer against soil acidification. Soils with a higher clay fraction tend to have a higher CEC. Organic matter has a very high CEC. As CEC increases, more nutrients are attached to soil particles, and fewer remain in the soil solution. Since the nutrients in soil solution are available to plants, this means that while there are plenty of nutrients in the soil, the plants may not be able to take advantage of them.

The Cation Exchange Capacity (CEC) of soils from Masaka HUB

Analytical Lab:	Soil and Plant Analytical Laboratories at NARL		
Client:	New Plan -CEC (552-573)		
District	Masaka HUB (nMasaka, Kalungu, Kyotera)		
Village			
Type of Sample:	Soil samples		
Date of Analysis:	August 22		
Lab No.	Client's Reference	CEC	
		me/100g	
S/22/552	A3A3	10.4	
S/22/553	K3	15.1	
S/22/554	B2	12.6	
S/22/555	C1	18.8	
S/22/556	D1	13.2	
S/22/557	KK4	19.1	
S/22/558	E2	19.7	
S/22/559	P3	15.7	
S/22/560	P4	17.7	
S/22/561	Q2	24.7	
S/22/562	N2	18.2	
S/22/563	KK1	12.5	
S/22/564	BB1	18.4	
S/22/565	BB4	15.6	
S/22/566	KK5	10.9	
S/22/567	KA 2	18.1	
S/22/568	BK1	12.5	
S/22/569	BK1	15.5	
S/22/570	BA2	12.8	
S/22/571	BA4	12.5	
S/22/572	Namugoma sample 2	11.5	
S/22/573	TC2	10.7	

SOIL TEST RESULTS IN RELATION TO GROWTH OF OIL PALM

Sandy clay and silty clay soils are the most suitable for growth of Oil Palm they are poorly drained hence can help maintain the soil around oil palm trees to be in a moist environment. The soils can store sufficient water and plant nutrients. Oil palms grow well in the pH range in between 4.3 to 6.5. However, due to oil palm trees tolerance to acidity, this allows them to continue growing despite of low pH down to 3.9–4.2. Oil palm growth will be stunted if the pH drops too low.

RECOMMENDATIONS

Application of inorganic fertilizers and organic manure will be required in the areas where the soil samples were collected from. Farmers should aim at obtaining higher yield, it is important that an Integrated Soil Fertility Management (ISFM) approach is used. This involve application of both organic and inorganic sources of nutrients i.e., to improve the low inherent soil fertility status reported from the laboratory analysis and also to maintain the fertility status in the areas where the nutrient levels are from average to above average. Maintaining average to above average soil fertility status is important to avoid the decline in crop yields with time, associated with soil nutrient mining, this is common in Uganda. An ISFM approach is important because it also involve soil and water management plus conservation, because if the soil is not conserved all the nutrients that will be applied from organic and inorganic sources will be lost through run off and soil erosion. This has a negative effect on the entire ecosystem.

Other aspects of ISFM include the addition of organic materials, which are sources of energy and food for the soil flora and fauna. Maintaining good soil physical properties and ecosystem services are vital for the sustainability of the ecosystem functions. Controlling soil erosion through the use of grass strips, furrows, contour ditches as important to prevent loss of soil from the gardens and the nutrients. Usually, the fertility of soils in Uganda is in the top 0 – 20 cm which is lost through soil erosion. The combination of organic and inorganic nutrient sources is a better soil fertility improvement and management strategy because it results into synergy and improved conservation and synchronization of nutrient release and crop demand, leading to

increased fertilizer use efficiency and higher yields. It is better approach for restoring and maintaining soil productivity and best suited for farming systems in Uganda like in other countries south of the Sahara.

BEST FERTILIZER MANAGEMENT PRACTICES

To improve fertilizer, use efficiency i.e., increase in crop yield per kg of fertilizer applied, it is recommended that farmers adopt four best management practices that is 4R's or four rights of fertilizer management. These include applying the **Right** source of nutrients needed by a plant, at the **Right** rate to supply the quantity needed by the plant, at the **Right** time to be taken by the plant and in the **Right** place /Right application method to be accessible by plant roots and meet crop demand. These 4R's help to improve the recovery fraction of fertilizer and improve agronomic efficiency. Correct practice of the 4R's management practices will result in increased crop yields and incomes, as well as prevention of soil nutrient depletion.

Therefore, the four “rights” provide a simple checklist to assess whether a crop has been fertilized properly. The overall question “Was the crop given the right source of nutrients at the right rate, time, and place?” helps farmers to identify opportunities for improvement in fertilizing each specific crop in each specific field. There should be a balance of effort among the four rights. Fertilizer use will not be right if any of the 4Rs is not implemented correctly.

Right Fertilizer

This means matching the fertilizer source and product to the crop's needs and soil properties.

- (a) Fertilizer can be applied as straight or compound fertilizers and bulk blends.

Compound fertilizers e.g. DAP, NPK etc. provide several nutrients in one product hence they are more convenient to the farmer over the use of straight fertilizers e.g. urea, TSP, SSP, CAN. However compound fertilizers are more costly, hence they and should be used if they are more cost effective. In the end the farmer's choice will depend on local availability of the fertilizer materials.

- (b) There is interactions between nutrients. For instance, application of phosphorus and potassium fertilizers is required on these soils to achieve full response to

- nitrogen fertilizer and achieve target crop yield levels. Further application of secondary and trace elements will be required for higher target crop yield levels.
- (c) The choice of fertilizer depends, on the particular crop, farmers' management practices, soil properties and climate conditions.

Right application rate

This means matching the amount of fertilizer applied to the need of the crop. Fertilizer rates are estimated after considering;

- (a) Nutrient requirements of the crop
- (b) The capacity of the soil to supply the nutrients
- (c) The quantity of nutrients applied in crop residues, farm yard manure and other farmers nutrient management practices
- (d) The target yields.
- (e) Attainable yield under farmer's practice
- (f) Cost of fertilizers and value of crop products

Applying too much fertilizer leads to waste of nutrients not taken up by the crops and contamination of the environment. Too little fertilizers result in low crop yield and crop quality and less residues to protect from soil erosion and build the soil organic matter or use as animal fodder.

Right time for fertilizer application

This means applying fertilizers at the right time making nutrients available to crops when they need them.

- (a) Nutrients are used most efficiently when their availability is synchronized with crop demand. Basal fertilizers applications is done at or just after planting to supply N, P, K and other nutrients required for early crop growth
- (b) Nitrate from applied fertilizers is highly mobile and easily lost from the soil through leaching. Therefore, it is advisable to apply some of the target nitrogen as a "top dressing" at key stages during crop development when the crop is growing fastest and need a lot of nitrogen.

- (c) Top-dressing fertilizer nitrogen can be applied in more than one split application to improve fertilizer use efficiency. The rates can be adjusted accordingly to how well the crop is developing and expected price of crop products.
- (d) Top-dressing produces agronomic results if the crop is developing well under favorable climatic conditions and good economic results if high crop prices are expected. If the crop has developed poorly due to poor rainfall and the price of crop outputs are expected to be low, top dressing can be cancelled and the fertilizer reserved for next planting season.

Right placement of fertilizer

This means applying fertilizer when the crop can access the nutrients contained in the fertilizer. The choice of application method by the farmer will depend on the labor required. The method of application should be based on the crop and soil properties. As a must fertilizer should be incorporated into the soil to avoid loss through volatilization especially nitrogen-based fertilizers but also to increase the chances of plant roots getting into contact with the fertilizers

Appendix 6: List of plant species recorded within Kalungu District Landscape

Family	Species Name	Plant life form								IUCN Status
		Fern	Forb	Grass	Herb	Sedge	Shrub	Tree	Tuber	
Mimosaceae	<i>Acacia hockii</i>						✓			LC
Fabaceae	<i>Acacia senegalensis</i>						✓			LC
Mimosaceae	<i>Acacia sieberiana</i>						✓			LC
Acanthaceae	<i>Acanthus pubescens</i>				✓					LC
Amaranthaceae	<i>Achyranthes aspera</i>				✓					LC
Papilionaceae	<i>Aeschynomene elaphroxylon</i>						✓			LC
Asteraceae	<i>Ageratum conyzoides</i>				✓					LC
Fabaceae	<i>Albizia coriaria</i>						✓			LC
Fabaceae	<i>Albizia grandibracteata</i>						✓			LC
Fabaceae	<i>Albizia zygia</i>						✓			LC
Asphodelaceae	<i>Aloe vera</i>				✓					LC
Amaranthaceae	<i>Amaranthus spinosus</i>				✓					LC
Bromeliaceae	<i>Ananas comosus</i>						✓			LC
Asteraceae	<i>Aspilia africana</i>				✓					LC
Meliaceae	<i>Azadirachta indica</i>							✓		LC
Asteraceae	<i>Bidens pilosa</i>		✓							LC
Poaceae	<i>Bracharia jubata</i>									LC
Poaceae	<i>Brachiaria decumbens</i>			✓						LC
Poaceae	<i>Brassica carinata</i>			✓						LC
Poaceae	<i>Brassica elongate</i>			✓						LC
Brassicaceae	<i>Brassica oleracea</i>			✓						LC
Fabaceae	<i>Calliandra angustifolia</i>						✓			LC
Fabaceae	<i>Calliandra calothyrsus</i>						✓			LC
Apocynaceae	<i>Calotropis procera</i>				✓					LC
Burseraceae	<i>Canarium schweinfurthii</i>							✓		LC
Caricaceae	<i>Carica papaya</i>							✓		LC
Poaceae	<i>Chloris gayana</i>			✓						LC

Family	Species Name	Plant life form								IUCN Status
		Fern	Forb	Grass	Herb	Sedge	Shrub	Tree	Tuber	
Rutaceae	<i>Citrus limon</i>						✓			LC
Rutaceae	<i>Citrus sinensis</i>						✓			LC
Poaceae	<i>Coix lacryma-jobi</i>			✓						LC
Commelinaceae	<i>Commelina benghalensis</i>				✓					LC
Commelinaceae	<i>Commelina diffusa</i>				✓					LC
Cucurbitaceae	<i>Cucurbita maxima</i>		✓							LC
Poaceae	<i>Cynodon dactylon</i>			✓						LC
Cyperaceae	<i>Cyperus rotundus</i>					✓				LC
Poaceae	<i>Digitaria abyssinica</i>			✓						LC
Poaceae	<i>Digitaria longiflora</i>			✓						LC
Dioscoreaceae	<i>Dioscorea cayennensis</i>								✓	LC
Dioscoreaceae	<i>Dioscorea rotundata</i>					✓				LC
Ebenaceae	<i>Diospyros abyssinica</i>						✓			LC
Dracaenaceae	<i>Dracaena fragrans</i>				✓					LC
Dracaenaceae	<i>Dracaena steudneri</i>						✓			LC
Dracaenaceae	<i>Dracaena triasciata</i>				✓					LC
Poaceae	<i>Echinochloa colona</i>			✓						LC
Poaceae	<i>Eleusine coracana</i>			✓						LC
Poaceae	<i>Eleusine indica</i>			✓						LC
Poaceae	<i>Eragrostis ciliaris</i>			✓						LC
Poaceae	<i>Eragrostis curvula</i>			✓						LC
Poaceae	<i>Eragrostis olivaceae</i>			✓						LC
Poaceae	<i>Eragrostis pilosa</i>			✓						LC
Poaceae	<i>Eragrostis sp</i>			✓						LC
Poaceae	<i>Eragrostis tenuifolia</i>			✓						LC
Myrtaceae	<i>Eucalyptus grandis</i>							✓		LC
Moraceae	<i>Ficus natalensis</i>							✓		LC
Moraceae	<i>Milicia excelsa</i>							✓		NT

Family	Species Name	Plant life form								IUCN Status
		Fern	Forb	Grass	Herb	Sedge	Shrub	Tree	Tuber	
Proteaceae	<i>Grevillea robusta</i>							✓		LC
Poaceae	<i>Hyparrhenia filipendula</i>			✓						LC
Poaceae	<i>Hyparrhenia rufa</i>			✓						LC
Meliaceae	<i>Khaya anthotheca</i>							✓		VU
Verbenaceae	<i>Lantana camara</i>						✓			LC
Poaceae	<i>Leersia hexandra</i>			✓						LC
Anacardiaceae	<i>Mangifera indica</i>							✓		LC
Bignoniaceae	<i>Markhamia lutea</i>							✓		LC
Fabaceae	<i>Mimosa pigra</i>						✓			LC
Musaceae	<i>Musa paradisiaca</i>						✓			LC
Lamiaceae	<i>Ocimum gratissimum</i>				✓					LC
Poaceae	<i>Oryza glaberrima</i>			✓						LC
Oxalidaceae	<i>Oxalis latifolia</i>				✓					LC
Poaceae	<i>Panicum brevifolium</i>			✓						LC
Poaceae	<i>Panicum maximum</i>			✓						LC
Poaceae	<i>Panicum trichocladum</i>			✓						LC
Poaceae	<i>Paspalum notatum</i>			✓						LC
Poaceae	<i>Paspalum scrobiculatum</i>			✓						LC
Poaceae	<i>Pennisetum purpureum</i>			✓						LC
Lauraceae	<i>Persea americana</i>						✓			LC
Myrtaceae	<i>Psidium guajava</i>						✓			LC
Euphorbiaceae	<i>Ricinus communis</i>						✓			LC
Poaceae	<i>Rottboellia cochinchinensis</i>			✓						LC
Poaceae	<i>Saccharum officinarum</i>			✓						LC
Fabaceae	<i>Senna spectabilis</i>				✓					LC
Solanaceae	<i>Solanum lycopersicum</i>				✓					LC
Solanaceae	<i>Solanum nigrum</i>				✓					LC
Bignoniaceae	<i>Spathodea campanulata</i>							✓		LC

Family	Species Name	Plant life form								IUCN Status
		Fern	Forb	Grass	Herb	Sedge	Shrub	Tree	Tuber	
Poaceae	<i>Sporobolus pilifeus</i>			✓						LC
Myrtaceae	<i>Syzygium cuminii</i>							✓		LC
Papilionaceae	<i>Tephrosia voegellii</i>						✓			LC
Asteraceae	<i>Vernonia amygdalina</i>						✓			LC
Poaceae	<i>Zea mays</i>			✓						LC
Pontederiaceae	<i>Eichornia crassipes</i>				✓					LC
Poaceae	<i>Setaria verticillate</i>			✓						LC
Poaceae	<i>Cymbopogon nardus</i>			✓						LC
Fabaceae	<i>Dlbergia sissoo</i>							✓		LC
Fabaceae	<i>Leucaena leucocephala</i>						✓			LC
Fabaceae	<i>Prosopis spp</i>						✓			LC
Asteraceae	<i>Chromolaena odorata</i>			✓						LC
Arecaceae	<i>Phoenix reclinata</i>							✓		LC
Amaranthaceae	<i>Celosia trigyna</i>				✓					LC
Capparaceae	<i>Capparis erythrocarpus</i>						✓			LC
Phyllanthaceae	<i>Bridelia micrantha</i>							✓		LC
Malvaceae	<i>Triumfetta macrophylla</i>						✓			LC
Zingiberaceae	<i>Aframomum angustolum</i>						✓			LC
Fabaceae	<i>Eiosema salignum</i>				✓					LC
Cyperaceae	<i>Cyperus papyrus</i>					✓				LC
Euphorbiaceae	<i>ACalypha indica</i>				✓					LC
Asteraceae	<i>Microglossa pyriolia</i>				✓					LC
Poaceae	<i>Imperata cylindrica</i>			✓						LC
Malvaceae	<i>Triumfetta rhomboidea</i>						✓			LC
Fabaceae	<i>Eriosema glomeratum</i>				✓					LC
Compositae	<i>Solanecio angulatus</i>				✓					LC
Solanaceae	<i>Solanum mauritianum</i>						✓			LC
Poaceae	<i>Sporobolus pyramidalis</i>			✓						LC

Family	Species Name	Plant life form								IUCN Status
		Fern	Forb	Grass	Herb	Sedge	Shrub	Tree	Tuber	
Poaceae	<i>Sporobolus africana</i>			✓						LC
Poaceae	<i>Panicum trichocladum</i>			✓						LC
Poaceae	<i>Eeusine indica</i>			✓						LC
Poaceae	<i>Chloris gayana</i>			✓						LC
Poaceae	<i>Hyparrhenia rufa</i>			✓						LC
Poaceae	<i>Rottboellia cochinchinensis</i>			✓						LC
Poaceae	<i>Hyparrhenia filipendula</i>			✓						LC
Poaceae	<i>Phragmites australis</i>			✓						LC
Commelinaceae	<i>Commelina capitata</i>				✓					LC
Commelinaceae	<i>Palisota mannii</i>				✓					LC
Aspleniaceae	<i>Asplenium holstii</i>	✓								LC
Cyperaceae	<i>Cyperus renschii</i>					✓				LC
Dracaenaceae	<i>Dracaena baya</i>				✓					LC
Fabaceae	<i>Newtonia buchananii</i>							✓		LC
Meliaceae	<i>Lovoa trichiloides</i>							✓		LC
Rhamnaceae	<i>Maesopsis eminii</i>							✓		LC
Poaceae	<i>Oplismenus hirtellus</i>			✓						LC
Pinaceae	<i>Pinus caribaea</i>							✓		LC
Euphorbiaceae	<i>Manihot esculenta</i>								✓	

Appendix 7 Coordinates of where invasive plant species were recorded

SN	Species name	UTM 36M
1	<i>Lantana camara</i>	Nearly Reported in all sample locations All farmlands and Open grassland areas
2	<i>Oxalis latifolia</i>	377580 m E, 99868591 m S; 364909 m E, 9976651 m S Reported on all farmlands
3	<i>Senna spectabilis</i>	363281 m E, 9978066 m S, Farmlands and Plantations
4	<i>Bidens pilosa</i>	Nearly Reported in all sample locations All farmlands and Open grassland areas
5	<i>Cynodon dactylon</i>	Nearly Reported in all sample locations All farmlands and Open grassland areas
6	<i>Eichhornia crassipes</i>	375056 m E, 9974610 m S, 375630 m E, 9975646 m S, 374490 m E, 9997094 m S, 360196 m E, 5947 m N 350809 m E, 5746 m N, 350456 m E, 5433 m N
7	<i>Salvinia molesta</i>	
8	<i>Setaria verticillate</i>	352033 m E, 6225 m N, 350653 m E, 4982 m N 360196 m E, 5947 m N 350809 m E, 5746 m N,
9	<i>Mimosa pigra</i>	374490 m E, 9997094 m S, 36 N 360196 m E, 5947 m N 350709 m E, 3998 m N 350318 m E, 4678 m N All marshland and Wetland franks that have been encroached has populations of <i>Mimosa pigra</i>
10	<i>Cymbopogon nardus</i>	362651 m E, 4151 m N 362439 m E, 4900 m N
11	<i>Dalbergia sissoo</i>	360525 m E, 4814 m N
12	<i>Acacia hockii</i>	372523 m E, 9994728m S, 359492 m E, 5695 m N, 359698 m E, 5896 m N
13	<i>Leucaena leucocephala</i>	372177 m E, 9995271 m S
14	<i>Prosopis spp</i>	36N 354803 m E, 1317 m N, 352903 m E, 5141 m N 372302 m E, 9994773 m S
15	<i>Chromolaena odorata</i>	366031 m E, 9991423 m S, 367961 m E, 9991938 m S 366847 m E, 9990569 m S

Appendix 8: Water Quality Test Results



NATIONAL WATER & SEWERAGE CORPORATION
CENTRAL LABORATORY- Plot M11, Old Portbell Rd, Bugolobi
P.O BOX 7053 KAMPALA, Email: external.services@nWSC.co.ug

CERTIFICATE OF ANALYSIS

Client: Newplan Limited
Address: Crusaders House , Kampala
Sample Description: Sample LV2
Received Date: 19.07.2022
Sampled By: Client's Staff
Sample Number : 50/2000/2022/C

Document No: NWSC/WQ/QF/21.2A
Invoice No:131/INV/2022/786_QUO

Parameters	Units	Test Results	National Standards for UnTreated Water	Test Method
Ammonia-N	mg/L	0.266	0.5	Hach 8038
B.O.D	mg/L	2.88	Not Specified	APHA-5210-B
COD	mg/L	25	Not Specified	APHA - 5220-2
Electrical Conductivity (EC)	uS/cm	56.5	2500	APHA-2510
Nitrate-N	mg/L	0.01	45	Hach 8192
Potassium (K)	mg/L	0.1	100	APHA-3111A
Sodium: Na	mg/L	11.4	200	APHA-3111A
Total Dissolved Solids (TDS)	mg/L	36.16	1500	APHA-2540C
Total Phosphorous (TP)	mg/L	0.66	2.2	APHA-4500-P- E
Total Suspended Solids (TSS)	mg/L	10	0.0	APHA-2540D

Remarks:

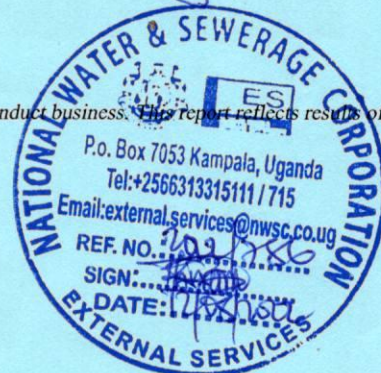
Chemistry :The water sample tested showed complying physiochemical characteristics with exception of TSS as provided for by the National Standards for Untreated Potable water.

AUTHORISED BY: Manager Central Laboratory Services.....

APPROVED BY: Senior Manager - Water Quality Management



*** The NWSC certificate of analysis by no means continues to permit to any person or company undertaking to conduct business. The report reflects results of the sample as received at the laboratory premises.





NATIONAL WATER & SEWERAGE CORPORATION
CENTRAL LABORATORY- Plot M11, Old Portbell Rd, Bugolobi
P.O BOX 7053 KAMPALA, Email: external.services@nWSC.co.ug

CERTIFICATE OF ANALYSIS

Client: Newplan Limited
Address: Crusaders House , Kampala
Sample Description: Sample R1
Received Date: 19.07.2022
Sampled By: Client's Staff
Sample Number : 50/2002/2022/C

Document No: NWSC/WQ/QF/21.2A

Invoice No: 131/INV/2022/786_QUO

Parameters	Units	Test Results	National Standards for UnTreated Water	Test Method
Ammonia-N	mg/L	0.48	0.5	Hach 8038
B.O.D	mg/L	6.36	Not Specified	APHA-5210-B
COD	mg/L	19	Not Specified	APHA - 5220-2
Electrical Conductivity (EC)	uS/cm	25	2500	APHA-2510
Nitrate-N	mg/L	0.00	45	Hach 8192
Potassium (K)	mg/L	0.2	100	APHA-3111A
Sodium: Na	mg/L	2.8	200	APHA-3111A
Total Dissolved Solids (TDS)	mg/L	16.00	1500	APHA-2540C
Total Phosphorous (TP)	mg/L	0.68	2.2	APHA-4500-P- E
Total Suspended Solids (TSS)	mg/L	5	0.0	APHA-2540D

Remarks:

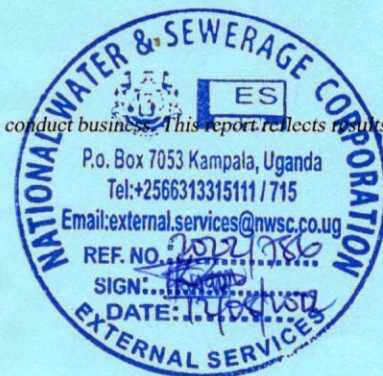
Chemistry :The water sample tested showed complying physiochemical characteristics with exception of TSS as provided for by the National Standards for Untreated Potable water.

AUTHORISED BY: Manager Central Laboratory Services.....

APPROVED BY: Senior Manager - Water Quality Management



*** The NWSC certificate of analysis by no means continues to permit to any person or company undertaking to conduct business. This report reflects results of the sample as received at the laboratory premises.





NATIONAL WATER & SEWERAGE CORPORATION
CENTRAL LABORATORY- Plot M11, Old Portbell Rd, Bugolobi
P.O BOX 7053 KAMPALA, Email: external.services@nWSC.co.ug

CERTIFICATE OF ANALYSIS

Client: Newplan Limited
Address: Crusaders House , Kampala
Sample Description: Sample R2
Received Date: 19.07.2022
Sampled By: Client's Staff
Sample Number : 50/2003/2022/C

Document No: NWSC/WQ/QF/21.2A

Invoice No:131/INV/2022/786_QUO

Parameters	Units	Test Results	National Standards for UnTreated Water	Test Method
Ammonia-N	mg/L	0.88	0.5	Hach 8038
B.O.D	mg/L	4.20	Not Specified	APHA-5210-B
COD	mg/L	15	Not Specified	APHA - 5220-2
Electrical Conductivity (EC)	uS/cm	30.2	2500	APHA-2510
Nitrate-N	mg/L	0.00	45	Hach 8192
Potassium (K)	mg/L	0.3	100	APHA-3111A
Sodium: Na	mg/L	4.9	200	APHA-3111A
Total Dissolved Solids (TDS)	mg/L	19.33	1500	APHA-2540C
Total Phosphorous (TP)	mg/L	0.445	2.2	APHA-4500-P- E
Total Suspended Solids (TSS)	mg/L	9	0.0	APHA-2540D

Remarks:

Chemistry :The water sample tested showed complying physiochemical characteristics with exception of TSS as provided for by the National Standards for Untreated Potable water.

AUTHORISED BY: Manager Central Laboratory Services.....

APPROVED BY: Senior Manager - Water Quality Management



*** The NWSC certificate of analysis by no means continues to permit to any person or company undertaking to conduct business with NWSC, to reflect results of the sample as received at the laboratory premises.





NATIONAL WATER & SEWERAGE CORPORATION
CENTRAL LABORATORY- Plot M11, Old Portbell Rd, Bugolobi
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CERTIFICATE OF ANALYSIS

Client: Newplan Limited
Address: Crusaders House , Kampala
Sample Description: Sample LV1
Received Date: 19.07.2022
Sampled By: Client's Staff
Sample Number : 50/1999/2022/C

Document No: NWSC/WQ/QF/21.2A
Invoice No:131/INV/2022/786_QUO

Parameters	Units	Test Results	National Standards for UnTreated Water	Test Method
Ammonia-N	mg/L	0.213	0.5	Hach 8038
B.O.D	mg/L	4.08	Not Specified	APHA-5210-B
COD	mg/L	27	Not Specified	APHA - 5220-2
Electrical Conductivity (EC)	uS/cm	111.1	2500	APHA-2510
Nitrate-N	mg/L	0.05	45	Hach 8192
Potassium (K)	mg/L	1.9	100	APHA-3111A
Sodium: Na	mg/L	17.1	200	APHA-3111A
Total Dissolved Solids (TDS)	mg/L	71.10	1500	APHA-2540C
Total Phosphorous (TP)	mg/L	0.735	2.2	APHA-4500-P- E
Total Suspended Solids (TSS)	mg/L	26	0.0	APHA-2540D

Remarks:

Chemistry :The water sample tested showed complying physiochemical characteristics with exception of TSS as provided for by the National Standards for Untreated Potable water.

AUTHORISED BY: Manager Central Laboratory Services.....

APPROVED BY: Senior Manager - Water Quality Management



*** The NWSC certificate of analysis by no means continues to permit to any person or company undertaking to conduct business. This report reflects results of the sample as received at the laboratory premises.



Appendix 9: Climate Change mitigation potential of the National Oil Palm project with the Ex-Ante Carbon Balance Tool (EX-ACT)

Climate Change mitigation potential of the National Oil Palm project with the Ex-Ante Carbon Balance Tool (EX-ACT)

1. INTRODUCTION

1.1 Project Background

The agricultural sector remains the backbone of the Ugandan economy. About 40% of the land area of the country is considered arable and of this about 30% is currently being cropped. While most of the country has two cropping seasons, production in the north is limited to one. Agriculture provided 22% of national GDP and 53% of Uganda's export earnings over 2007-2011 period, and contributes a large share of the raw materials for industry. Food crops dominate, followed by cash crops, while non-traditional export crops are also important.

About three quarters of agricultural households derive their livelihoods from largely subsistence-oriented, low input rain fed agriculture, with holdings averaging less than 1.5 ha (only 1% of agricultural land is irrigated). Yields remain low for most food crops and are generally poor for cash crops. In spite of problems of fertility and high soil nutrient loss, there is a limited application of the 'green revolution technology': use of improved farming practices and fertilizers remains among the lowest in the region, with less than 10% of smallholders using fertilizer occasionally. Post-harvest management and handling is limited and the majority of farmers rely on traditional systems for grain handling and storage, leading to up to 30% post-harvest losses.

Vegetable oil consumption in Uganda mounted to about 540,000 tons in 2014, though this translated to extremely low per capita consumption rates: 8.2 kg/capita per annum compared to 21.0 kg/capita per annum in developed countries. Only half the national demand is met by net domestic vegetable oil production (i.e., total production less exports); the remainder coming from imports. The preponderant share of vegetable oil imports is accounted for by Crude Palm Oil (CPO), which is refined into vegetable oil locally by about six processors, two of which are large scale – and one of which, BIDCO Uganda Limited, is the private sector partner under the IFAD-supported Vegetable Oil Development Project (VODP). On the other hand, because of its distance from the sea, Uganda's import parity price for CPO is relatively high, so favouring local production of oil palm and oil seeds.

To this effect, the Government of Uganda (GoU) under the Ministry of Agriculture, Animal industries and Fisheries (MAAIF) intends to implement the National Oil Palm Project (NOPP), a ten-year project, facilitating a Public-Private Producer-Partnership (4Ps), that was signed 2018, between the government of Uganda and the International Fund for Agricultural Development (IFAD)- the public sector. The IFAD financing includes a US\$ 75.82 million loan and a US\$ 1.21 million grant.

The overarching goal of the project is an inclusive rural transformation through Oil Palm investment, with a development objective of sustainably increasing rural income through opportunities generated by the establishment of an efficient Oil Palm industry that complies with modern environmental and social standards. While MAAIF is the lead agency in the implementation of NOPP through a Project Management Unit (PMU), the other key players will include BIDCO Uganda Limited-the Private Sector, and Smallholder farmers-the producers, who together have shares in a holding company for primary processing.

The NOPP targets 30,800 households, representing 154,000 beneficiaries, over the project life. Of these, 11,000 households will be targeted for Oil Palm growing, 19,800 households for alternative economic opportunities and/or mitigation of social risks. The project will be implemented in five hubs; Buvuma hub comprising of Buvuma district; Mayuge hub comprising of Mayuge, Namayingo and Bugiri districts; Masaka hub comprising of Masaka, Kalungu and

Kyotera districts, Mukono hub comprising of Mukono and Buikwe districts, and Kalangala hub, comprising of Kalangala district. In particular, the Masaka hub as a Key Result Area (KRA) will require a total of 3,000 hectares of Oil Palm plantations to be raised by smallholder farmers, targeting a total of 2,308 smallholder farmers to benefit from the project.

As part of feasibility studies of the NOPP, an Environmental and Social Impact Assessment (ESIA) is being carried out for Kyotera district to analyse possible project alternatives, identify and assess potential environmental and social impacts (both positive and negative), and suggest mitigation measures for the negative impacts, and enhancement of positive impacts. This is in accordance with the National Environment Act, 2019 (schedule 5 (6a) and the National Environment (Environmental and Social Assessment) Regulations, 2020. According to the National Environment (Environmental and Social Assessment) Regulations, 2020, regulation 13, a scoping exercise and an Environmental and Social Impact study should be undertaken for projects mandated for ESIA under section 113 of the Act. In this regard, specialist studies such as an account of greenhouse gas emissions analysis not limited to sources but also sinks of GHG are crucial for ensuring smallholder oil palm plantations are established and maintained in an ecologically and environmentally sound manner with a reduced carbon footprint. This report, therefore presents findings of detailed climate change assessments for the proposed implementation of NOPP in **MASAKA HUB** (Kalungu, Kyotera and Masaka district respectively).

1.2 Objectives and Delimitations

The objectives of the study are; to quantitatively estimate the greenhouse gas emissions of a reference or baseline scenario (Masaka hub without the intervention of the proposed oil palm project) versus the emissions resulting from the NOPP (adding climate-smart agricultural activities to the proposed establishment of smallholder oil palm plantation activities).

The Project seeks to support poor and vulnerable households – smallholder oil palm growers and others – in the communities located within the MASAKA HUB (Kalungu, Kyotera and Masaka district respectively) totalling to 3,000ha in general. The principal targeting mechanisms will include: (i) setting a 2 ha upper limit per household for the area of oil palm to be eligible for Project financing; (ii) promoting the participation of women and youth in all Project activities, and using gender sensitive approaches; (iii) promoting environment, health and safety (EHS) measures; (iv) promoting alternative economic opportunities in the oil palm communities; and (v) addressing the potentially negative effects of the oil palm investment. A first target group will be prospective smallholder oil palm growers in the four new hubs (plus those already growing oil palm in Kalangala), most of them with less than 2 ha to dedicate to oil palm production. A second target group will be poor families in communities where oil palm investment will take place, who will be assisted to respond to the increased economic opportunities; and will participate in household mentoring and community activities-majorly on estates land.

Much of the required quantitative data for an EX-ACT analysis is not available. Some of the analysis in this report is based upon qualitative and semi-quantitative data from stakeholder consultations, farmer interviews and observations during field visits undertake in February 2022.

2. METHODOLOGY AND TOOLS USED

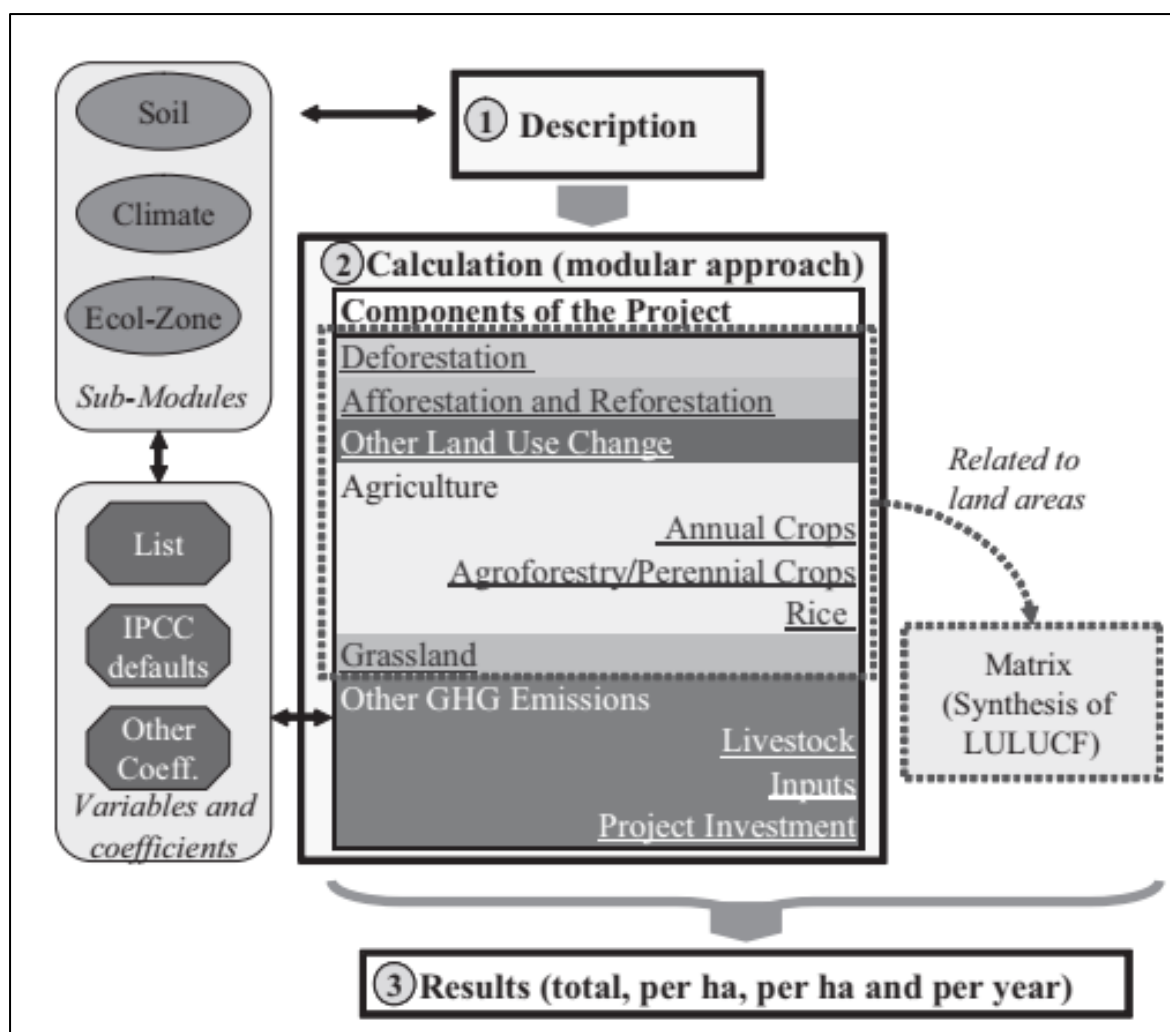
2.1 EX-ACT

EX-Ante Carbon Balance Tool (hereafter referred to as EX-ACT) is a land use-based accounting system developed by the Food and Agriculture Organization of the United Nations (FAO) to evaluate the effects of the interventions in agriculture¹ on greenhouse gas (GHG) emissions and carbon stock changes expressed as carbon-balance (see-<https://www.fao.org/in-action/epic/ex-act-tool/suite-of-tools/ex-act/en/>). The carbon-balance comprises of changes in GHG emissions and carbon stock changes in the five quantifiable carbon pools: above ground biomass, below ground biomass, litter, deadwood and soil. Therefore, EX-ACT determines the impacts on the carbon balance by comparing two scenarios: 'without project' (the 'business as usual' or 'baseline') and 'with project' (Bernoux et al., 2010).

EX-ACT is a land-based accounting system, measuring C stocks, stock changes per unit of land, and CH₄ and N₂O emissions expressed in t ha⁻¹ of CO₂-eq and t yr⁻¹ of CO₂-eq. The main output of the tool consists of the C-balance resulting from the difference between two scenarios: with and without project options. EX-ACT was designed to work at a project level but it can easily be up-scaled at programme/sector or national levels (Cerri et al., 2010).

2.2 Structure of EX-ACT

EX-ACT consists of a set of 18 linked Microsoft Excel sheets into which project designers insert information on dominant soil types and climatic conditions of the project area together with basic data on land use, land use change and land management practices foreseen under projects activities as compared to a "business as usual" scenario. EX-ACT adopts a modular approach – each "Module" describing a specific land use – and following a three-step logical framework (Figure 1): (i) general description of the project (geographic area, climate and soil characteristics, duration of the project);(ii) identification of changes in land use and technologies foreseen by project components (deforestation, afforestation/reforestation, annual/perennial crops, rice cultivation, grasslands, livestock, inputs, energy); and (iii) computation of the C-balance with and without the project using IPCC default values and when available – ad-hoc coefficients.



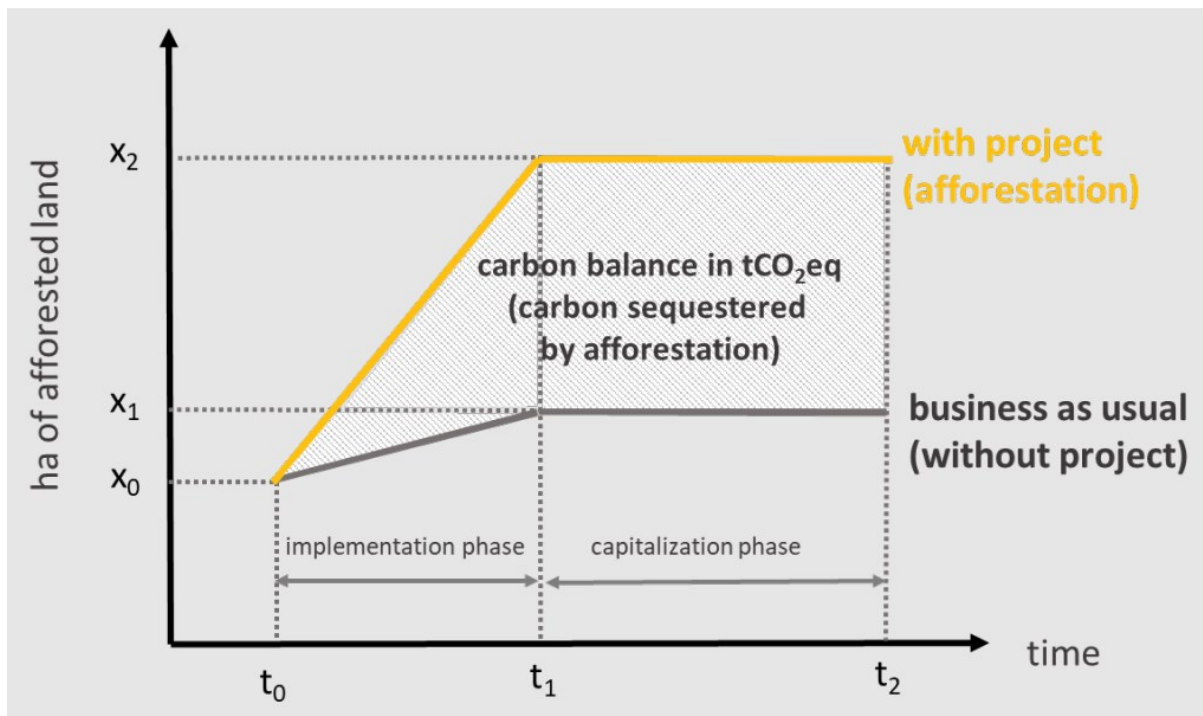
Source: (Bernoux et al, 2010)

Figure 1: Schematization of the modular EX-ACT structure

2.3 Underlying Concepts of EX-ACT

The analysis is conducted by comparing two scenarios: a situation when an intervention, for example a project, is implemented and a baseline situation that would prevail in the absence of the project (also referred to as “reference scenario”). The comparison between the GHG emissions and carbon stock changes resulting from the implemented project and those that would occur in the baseline (without the project) gives the final carbon-balance reported in EX-ACT.

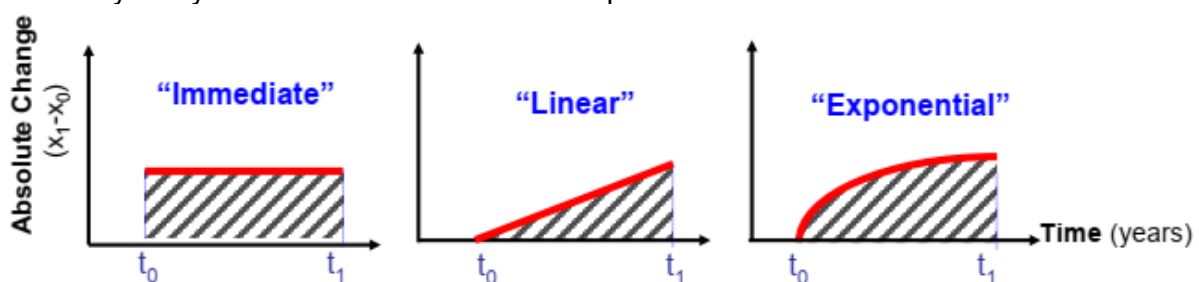
The tool distinguishes two periods of time related to the project: the implementation phase (i.e., the active phase of the project when activities are being implemented) and the capitalization phase (i.e., a period where emissions and carbon stock changes continue to occur as a result of the implemented activities). Figure 2 presents a hypothetical example of how the carbon balance is calculated in EX-ACT using an afforestation project. In a reference scenario, without project, only a small portion of land will be afforested (grey line). The project activities foresee afforestation at a larger scale (yellow line). Afforestation activities will occur in the period from t0 to t1 (implementation phase), yet the carbon will continue to be sequestered until t2 is reached (the capitalization phase). The overall benefits of afforestation project are calculated as the difference between with project and reference scenario, represented on the figure by the shaded area.



Source: FAO

Figure 2: Calculating carbon balance in EX-ACT

In terms of dynamics, land use changes associated with the establishment of project activities and the rate of adoption of land management options occur only during the implementation phase. Therefore, it is assumed that all project activities will be completed in the project timeframe and that no additional change in land use and management will take place during the capitalization phase. The EX-ACT default assumption for the land use and management change is a “linear” function over time, although the software allows for a different dynamic of change to be adopted, e.g “immediate” or “exponential” (Figure 2), depending on the characteristics of the specific project activity and on the information available on the adoption rate of the selected practice among project participants. This aspect is often considered in the sensitivity analysis where different rates of adoption are taken into account.



Source: (Bernoux et al, 2010)

Figure 3: Schematic representation of the dynamics of change in the implementation phase EX-ACT consists of a set of Microsoft Excel sheets in which project designers insert information on dominant soil types and climatic conditions of the project area together with basic data on land use, land use change and land management practices foreseen under project activities as compared to a business-as-usual scenario

2.3 Data used for the EX-ACT

While agricultural development projects usually implement a large set of complementary field actions, not necessary all project activities have impacts on GHG emissions and carbon sequestration. This section concisely summarizes the project activities that were considered for analysis by EX-ACT and also lists the taken assumptions on agro-ecological variables.

Ex-ante assessments are in parts necessarily based on assumptions and have to manage existing information gaps. The amount of missing information thereby decreases throughout the process of project design, while selected data can only adequately be collected as part of project monitoring and evaluation activities.

2.3.1 Agro-ecological variables

The project area is characterized by a warm tropical moist climate with a wet moisture regime (over 2000 mm). The dominant soil type was specified as Low Activity Clay Soils (LAC). Thereby the oil palm plantations will be established for about a period of 3-5 years, EX-ACT will account in addition for a 20-year period of capitalization, which is needed in order to capture the full impact of introduced changes in land use and management of soil and biomass carbon stocks within the Masaka, Kalungu and Kyotera district areas respectively.

2.3.2 Data on deforestation, forest degradation and afforestation

Secondary data sources such as the National Forestry System database under national forestry authority, FAOSTAT and other remote sensing data via <https://earthexplorer.usgs.gov/> was used for study and analysis.

2.3.3 Data on fertilisers

All potentials were considered with components of nitrogen (N), phosphorus (P), and potassium (K). Default GHG for CO₂eq values by IPCC were used and these are integrated/embedded in the EX-ACT tool for analysis.

2.4 Analysis

In the analysis it is assumed that the implementation phase will happen according to a linear dynamic of change (see figure 2), as no specific information is available about the adoption rate of the project activities among project participants. As concerns the Global Warming Potential (GWP) coefficient the current analysis uses the same values as those adopted within the Clean Development Mechanism (CDM), i.e., 21 for CH₄ and 310 for N₂O.

Therefore, the analysis is based on the identification of two alternative land use and management scenarios, i.e., “with” and “without” project.

2.4.1 Assumptions for the “with project” scenario

The “with project” scenario is built on the basis of the activities that the project will be implementing. The project intervention will focus on smallholders involve mobilizing smallholder producers to grow oil palm/plantation, establishment of an oil palm nursery, procurement and distribution of agrochemicals and fertilisers, oil palm field planting activities such as (land clearance, lining out, holing, planting, ablation, mulching, pest and disease management, pruning and weeding among others). The activities are essentially aimed at upscaling smallholder farmers who are currently practicing subsistence cropping and/or fishing, having up to 2ha of land suitable for oil palm development.

Therefore, the analysis considers that in the “with project” scenario, two-thirds of the existing annual cropland in the Kalungu, Kyotera and Masaka areas would be converted to perennial (essentially oil palm trees. While bush and shrub land would not be subject to any change with the project, grasslands are considered as degraded land which would be converted to non-

degraded as a consequence of the implementation of the sustainable land management practices.

The analysis also takes into account the project's role in promoting the adoption of improved cropland management on annual crops: improved agronomic practices, better water management and manure application. The new management would stop the practice of residue burning and promote improved residue management especially during the construction and plantation establishment phase.

2.4.2 Assumptions for the “without project” scenario

The second part of the analysis concerns the identification of the baseline scenario (the so-called “without project” case). Several assumptions regarding land use, land use changes, use of inputs and other investments are made. It is assumed that there would be no expansion of oil palm plantations on existing annual cropland (therefore overall perennial area equals 0); marginal land (bush and shrub lands) would remain unchanged. It is also assumed the with respect to input use in the “without project” scenario that on farm use of inorganic fertilizer would remain extremely low (less than 4,000 t/year, equivalent to 1 to 2 kg/ha).

2.5 Expected outcomes

Mitigation potential, which is reflected with the carbon balance indicator, can be calculated with EX-ACT according to two approaches: the *tier 1* and the *tier 2 approach*, respectively. The tier 1 approach uses default emission factors provided mainly by the Intergovernmental Panel on Climate Change (IPCC) (Bernoux et al, 2010). The tier 2 approach allows for the inclusion of ad-hoc emission factors, which are more adapted to the local context and more accurate than the IPCC's default factors. It is possible to use either approach, or combine the two in a single carbon-balance analysis. When precise field data is not available on fieldwork, the simplest way to proceed is to use the tier 1 approach. Due to lack of tier 2 data, this analysis only follows the tier 1 approach. For more accurate results, research can be carried out to gather data on emission factors provided by literature, local research or field measurements. When data is not available locally, the simplest way to proceed is to use the tier 1 approach.

In a first phase, EX-ACT could be applied to foresee the expected impacts of targeted project activities, using the tier 1 approach of the EX-ACT tool that only incorporates the default land use practices categories provided by the IPCC (Tinlot et al, 2011). In the second phase, different simulations could be done according to different adoption rates of recommended practices and by developing a variety of scenarios based on differing degrees of optimism or desirability of results.

In a third phase, the carbon-balance process could be repeated using accurate tier 2 emission factors integrated in the EX-ACT tool (Tinlot et al, 2011). This should support the generation and use of tier 2 coefficients through field measurements and other activities foreseen under oil palm project components. The proposed process requires using the tool at smallholder farmer level.

It is useful to have a rough estimation of the climate change mitigation potential of the project and develop different carbon-balance scenarios resulting from selected climate-smart practices (Tinlot et al, 2011). This would also facilitate the comparison between tier 1 and tier 2 appraisals.

3. THE CARBON-BALANCE ANALYSIS

Under the simulated scenario, the project would create a total carbon emission of almost **815,818** million tons of eq-CO₂. However, it would also create a total sink of **1.1 million** tons of eqCO₂, hence a net sink carbon balance of about 1.6 million tons of eq-CO₂ after 20 years. It is estimated that the project will lead to a land use change from current annual croplands, marginal and abandoned lands converted to forest land (plantation forests). In the scenario, it is projected that a total area of 2,000 ha will be adequate to offset the estimated GHG emissions from oil palm plantations coupled with the inputs (i.e.; fertilisers and other agrochemicals) especially during the capitalization phase (20 years) compared to a situation without any project intervention in which the annual cropland would have remained. An equivalent of **2.1** tons of eq-CO₂ will be sequestered by oil palm trees per hectare per year.

Project Name	National Oil Palm Project_Masaka HUB		Climate
Continent	Africa		Dominant Regional Soil Type
Components of the project	Gross fluxes		
	Without	With	Balance
	All GHG in tCO ₂ eq		
	Positive = source / negative = sink		
Land use changes			
Deforestation	0	0	0
Afforestation	0	-1,041,333	-1,041,333
Other LUC	0	519,201	519,201
Agriculture			
Annual	0	0	0
Perennial	0	-42,000	-42,000
Rice	0	0	0
Grassland & Livestocks			
Grassland	0	0	0
Livestocks	0	0	0
Degradation & Management			
Forest degradation	0	0	0
Peat extraction	0	0	0
Drainage organic soil	0	0	0
Rewetting organic soil	0	0	0
Fire organic soil	0	0	0
Coastal wetlands	0	0	0
Inputs & Investments	0	296,617	296,617
Fishery & Aquaculture	0	0	0
Total	0	-267,516	-267,516
Per hectare	0.0	-53.5	-53.5
Per hectare per year	0.0	-2.1	-2.1

Figure 4: Results given by the EX-ACT tool

4. CONCLUSION

The analysis of the ex-ante carbon-balance results shows that the project according to its current design, has a mitigation potential of more than one million tons of eq-CO₂ over 20 years, it therefore actively reduces anthropogenic emissions and tackles climate change. The mitigation impacts considered in the project design, and preceding environmental should be considered as positive externalities. In a context of rising concern of governments and civil society for Global Warming, this externality should represent a further incentive to support sustainable rural development in Uganda.

The oil palm project under Masaka hub case study reflects how an intensive accelerated project that acts on livelihood enhancement, smallholder farm productivity, incomes etc by increasing the use of inputs, can also be designed in terms of its mitigation potential. It particularly points out the fact that synergies are possible between food security and agriculture mitigation. The project gives both a short-term response by using large amounts of financed inputs (fertilisers and other agrochemicals) and a longer-term response by progressively reducing the amounts of inputs used to traditional practices of using cover crops (legume- *Mucuna bracteata*), slashing, minimum to no-tillage especially through spot weeding.