Queensland & Leeds
Civil & Environmental Engineers

MOTT MACDONALD

Kampala Industrial and Business Park Infrastructure Scheme

ESIA Volume II: Main ESIA Report

June 2019

QUEENSLAND & LEEDS CONSULTING ENGINEERS LTD

QUEENSLAND & LEEDS
CONSULTING
ENGINEERS LTD
27 Binayomba Road
Bugolobi
PO Box 22428
Kampala, Uganda

+256 414268466

Queensland.Leeds@engine
er.com

QUEENSLAND & LEEDS
CONSULTING
ENGINEERS LTD

Kampala Industrial and Business Park Infrastructure Scheme

ESIA Volume II: Main ESIA Report

June 2019

Registered number 80020001207621

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
A	29/06/2019	C. Martinez Garcia. J. Stroud L. Kajubi	C. Martinez Garcia. F. Kilmurray	J. Randall	Draft issue for client comment

Document reference: QL/EIA/1423

Information class: Standard

Contents

Acronyms and Abbreviations Table

Abbreviation/Acronym	Definition
AADT	Annual Average Daily Traffic
AoI	Area of Influence
AWE	Air Earth Water Ltd Consultants
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CBD	Convention on Biological Diversity
CCTV	Close-Circuit Television
CCU	Climate Change Unit of Ministry of Water and Environment
CITES	Convention on International Trade in Endangered Species
CLO	Community Liaison Officer
CMS	Convention on the Conservation of Migratory Species of Wild Animals
COP	Conference of the Parties
CRTN	Calculation of Road Traffic Noise
DEM	Digital Elevation Model
DIA	Direct Impact Area
DSM	Digital Surface Model
EHS	Environment, Health and Safety
EMS	Environmental Management System
EPC	Engineering, Procurement and Construction
EPRP	Emergency Preparedness and Response Plan
E&S	Environmental and social
ES	Environmental Statement
ESIA	Environmental and Social Impact Assessment
ESMP	Environment and Social Management Plan
EU	European Union
FPIC	Free, prior and informed consent
FRA	Flood Risk Assessment
GBV	Gender-based Violence
GHG	Greenhouse Gas
GIIP	Good International Industry Practice
GIS	Geographic Information System
HGV	Heavy Goods Vehicles
HH	Household
HIV/AIDS	Human Immunodeficiency Viruses/Acquired Immune Deficiency Syndrome
HR	Human Resources
I&AP	Interested and Affected Party
IBA	Important Bird and Biodiversity Areas
ICT	Information and Communication Technology
IFC	International Finance Corporation
ILO	International Labour Organization
IMP	Influx Management Plan
INDC	Intended Nationally Determined Contribution
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Areas
KCCA	Kampala Capital City Authority
KIBP	Kampala Industrial Business Park
LAI	Local Area of Impact
LCA	Landscape Character Area
LGV	Large Goods Vehicle
LRP	Livelihood Restoration Plan

Abbreviation/Acronym	Definition
LVIA	Landscape and Visual Impact Assessment
MEMD	Ministry of Energy and Mineral Development
MMP	Materials Management Plan
MoWE	Ministry of Water and Environment
MoWT	Ministry of Works and Transport
NBSAP	National Biodiversity Strategy and Action Plan II
NCFR	Namanve Central Forest Reserve
NDP	National Development Plan
NEA	National Environment Act
NEMA	National Environment Management Authority
NFA	National Forestry Authority
NGO	Non-governmental organisation
NGP	National Gender Policy
NIOSH	National Institute for Occupational Safety and Health
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NO_x	Oxides of Nitrogen
NTS	Non-technical Summary
NWSC	National Water and Sewerage Corporation
OHS	Occupational Health and Safety
OWMP	Operational Waste Management Plan
PAA	Project Affected Area
PM	Particulate matter
POPS	Persistent Organic Pollutants
PPE	Personal Protective Equipment
PS	Performance Standard
Q&L	Queensland and Leeds Consultants
RAP	Resettlement Action Plan
REL	Recommended Exposure Limit
SAICM	Strategic approach to international chemicals management
SEP	Stakeholder Engagement Plan
SME	Small and Medium-sized Enterprise
SO_2	Sulphur Dioxide
STI	Sexually Transmitted Infections
SWMS	Site Waste Management Strategy
TMP	Traffic Management Plan
ToR	Terms of Reference
TSP	Total Suspended Particulates
UIA	Uganda Investment Authority
UKEF	United Kingdom Export Fund
UN	United Nations
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCC	United Nations Framework Convention on Climate Change
UNMA	Uganda National Meteorology Authority
UNRA	Uganda National Roads Authority
VES	Visual Encounter Survey
WAI	Wider Area of Impact
WB	World Bank
WCS	Wildlife Conservation Society
WEL	Workplace Exposure Limits
WHO	World Health Organisation

Abbreviation/Acronym	Definition
WHS	World Heritage Sites
WMD	Wetlands Management Department
WRI	World Resources Institute
WWF	World Wildlife Fund
WWTW	Wastewater Treatment Works
ZTV	Zone of theoretical visibility

1. Introduction

1.1 Background

The Government of Uganda, through the Uganda Investment Authority (UIA) is supporting the development of the Kampala Industrial Business Park (KIBP), located at Namanve near Kampala, Uganda.

Queensland & Leeds Ltd, with support from Mott MacDonald Ltd, has been commissioned to undertake an Environmental and Social Impact Assessment (ESIA) to determine the impacts relating to the development of infrastructure ("the Scheme") to support the ongoing growth of the KIBP (see Section 2.1 for further information on the definition of "the Scheme"). This report comprises that ESIA.

This chapter provides an introduction to the ESIA and the organisations involved. This includes an outline of the structure of the rest of the report.

1.2 Overview

The KIBP is located 11 kilometres (km) east of central Kampala, at Namanve, as shown on Figure 2.3. It lies north and south of the Kampala-Jinja Highway and the Kampala – Mombasa railway and is proposed to connect to both.

The Government of Uganda plans for the KIBP to become a model industrial park for the rest of the country. As part of facilitating this, the Government has partially degazetted a peri-urban eucalyptus plantation forest area to help establish the KIBP.

A masterplan has been developed for the KIBP (Appendix 1.1) which divides it into areas for different uses, further details of which are provided in Chapter 2. Some parts of the KIBP are already operational and it is envisaged that some plots, where feasible, will continue to be developed alongside the implementation of the supporting infrastructure. These infrastructure elements comprise the focus of this ESIA.

In Uganda, projects of this scale are required to prepare and submit an ESIA. Schedule 3 (2b) of the National Environment Act Cap 153 lists infrastructure development e.g. industrial and business park development as one of the projects requiring ESIA studies prior to their implementation. An ESIA Scoping Opinion has been sought from the National Environmental Management Authority (NEMA) for Uganda (submitted 26th April 2019), with further information provided in Section 4.4.

Two previous ESIAs have been prepared and submitted for the Scheme. This ESIA represents an update to these previous ESIAs using the latest baseline information and any subsequent design changes. Information on the previous ESIAs is provided in Section 4.1.

This ESIA focusses upon the infrastructure developments required to facilitate the KIBP, rather than the individual plots themselves. The individual plots would be subject to their own ESIAs, independent of this ESIA. Further information on the description of the infrastructure scheme assessed in this ESIA is provided in Chapter 2. Other development aspects are considered to be outside the scope of this ESIA.

1.3 Scheme Parties

1.3.1 The Scheme Sponsor

The UIA was set up in 1991 as a statutory agency mandated to initiate and support measures that enhance investment in Uganda and advise its Government on appropriate policies conducive for investment promotion and growth.

As a semi-autonomous government agency, the UIA drives national economic growth and development in partnership with the private sector. The UIA's key activities include:

- Marketing investment opportunities;
- Promoting packaged investment projects;

- Ensuring local and foreign investors have access to information, especially about the business environment so as to make more informed business decisions; and
- Offering business support, advisory and advocacy services.

The UIA's mission is to promote, attract and retain value adding domestic and foreign direct investments through targeted marketing and aftercare services.

The UIA is supporting the development of the KIBP, including attracting investment, in order to help support the economic development of Uganda.

The UIA, is implementing the Second Private Sector Competitiveness Project (PSCP II) under credit from the World Bank (WB). Component 1 of the PSCP II concerns infrastructure development of the KIBP, and it is this component which is the focus of this assessment.

1.3.2 Contractor

The construction contractor for the infrastructure works is Lagan-Dott Joint Venture (JV). This JV has been formed specifically for the KIBP scheme and represents a collaboration between Ireland-based Lagan Specialist Contracting Ltd and East African-based Dott Services Ltd. Lagan-Dott JV, through liaison with other key parties such as UIA, has developed the feasibility study and detailed designs for the Scheme, and will lead the construction activities on site going forwards.

1.4 Timeline

The tasks undertaken to support this ESIA including baseline data collection, public consultation, detailed assessment and production of the management plans are noted below:

- ESIA Scoping of the Scheme commenced in March 2019 – completed and submitted to NEMA on 26th April 2019.
- Primary ESIA baseline data collection undertaken from March to May 2019 (specific dates for baseline data collection for each environmental and social (E&S) topic are included in the relevant impact assessment sections).
- NEMA submitted a letter of approval of the Terms of Reference for undertaking the ESIA, signed on the 31st May 2019.
- The ESIA is to be submitted in July 2019.
- The aim is for consent to be attained in late Summer 2019.
- The detailed design phase to commence in September 2019 and is due to continue through until February 2020.
- The construction phase is due to start in March 2020, continuing through until February 2023.
- Scheme handover is due in March 2023.
- A defects liability period of 365 days follows scheme handover.

1.5 ESIA Report Structure

The ESIA is broken down into four volumes:

- Volume I: Non-Technical Summary;
- Volume II: The Main ESIA Report (this document);
- Volume III: Figures and appendices associated with this Main ESIA Report; and
- Volume IV: Supporting specialist studies.

1.5.1 Structure of this Main ESIA

The structure and content of the ESIA report is shown in Table 1.1:

Table 1.1: Report structure

No.	Section	Description of Content
1	Introduction	Presents a brief overview, description of key stakeholder, and purpose of the ESIA study and report.
2	Scheme Description	Describes the Scheme, its main elements and activities for construction and operation.
3	Policy, Legal and Institutional Framework	Defines key national policy, legislation and international lender guidelines applicable to the Scheme, as well as key national institutions.
4	ESIA Scope and Methodology	Sets out the stages of the ESIA, key assumptions and methodologies for undertaking the ESIA.
5	Air Quality	Presentation of technical assessments undertaken. These include a summary of baseline conditions developed from quantitative and qualitative primary and secondary data sources and fieldwork and also environmental impacts and suggested mitigation measures. Direct and indirect impacts, temporary and permanent impacts of reversible or irreversible natures are identified, along with mitigation measures to be implemented in order to reduce a conclusion on the level of the resulting effects on the environment, both positive and negative. This mitigation has been informed by site visits to KIBP and meetings with the Contractor and NEMA to ensure that mitigation is both implementable and appropriate. The significance of the residual (post-mitigation) effects is presented.
6	Biodiversity and Conservation	
7	Geology and Soils	
8	Greenhouse Gases	
9	Cultural Heritage and Archaeology	
10	Landscape and Visual Amenity	
11	Noise and Vibration	
12	Socioeconomic Characteristics	
13	Traffic and Transport	
14	Waste and Materials Management	
15	Water Resources	
16	Cumulative Impacts	The assessment of cumulative impacts considers the combination of multiple impacts that may result when the Scheme is considered alongside other proposed projects, including those currently under development, in the same geographic area or similar development timetable. Multiple impacts upon the same receptor from within the Scheme will also be identified.
17	Information Disclosure	This chapter outlines the information disclosure, consultation and participation activities that have been undertaken as part of the ESIA process in accordance with the Stakeholder Engagement Plan (SEP).
18	Summary Conclusion	The overall conclusions of the ESIA are presented.
19	Outline Environmental and Social Management Plan (ESMP)	The ESMP and its associated sub-plans are live documents and will require regular review by UIA and/or their contractors (including Lagan-Dott), as set out within them; hence they are subject to future modification if required. Further detailed management plans will be developed for the construction and operational phases by the respective contractors in accordance with the policies, guidelines and legislation.
20	References	References used in the ESIA are presented.

1.5.2 Figures and Appendices

Smaller figures are presented in this document, however figures which are best presented outside of the text are provided in Volume III as Appendices, along with supporting reports which are also provided as Appendices. References to these are provided in the text where referred to.

1.5.3 Specialist Studies

In addition to this main ESIA and its appendices, specialist studies are provided, as detailed in Table 1.2. These are provided in Volume IV.

Table 1.2: Specialist studies to the ESIA in Volume IV

Specialist study	Description of Content
Preliminary Flood Risk Assessment (FRA)	The preliminary FRA incorporates the assessment of climate change impacts, in order to inform the drainage strategy and design for the scheme, as well as informing the ESIA and the post-development impacts on flood risk elsewhere.

Specialist study	Description of Content
Stakeholder Engagement Plan (SEP)	The SEP has been developed at the outset of the ESIA process to guide stakeholder engagement and public consultation activities throughout the ESIA process, and throughout the construction and operation of the Scheme. The SEP is a strategic document used to plan a comprehensive and culturally appropriate approach to consultation and disclosure. The SEP will remain a live document throughout the life of the Scheme and will be regularly reviewed throughout the course of the ESIA process, as well as during the construction and operation phases.
Livelihood Restoration Plan (LRP)	An LRP has been prepared to consider households who will be physically and/or economically displaced by the scheme. Given that there is the potential for displacement of an unidentified number of residential structures at this stage, these structures are formally identified and assessed during the baseline survey phase, and accordingly reflected in the LRP. This plan will summarise the national and international requirements for land

1.6 Contact Details

Contact details for enquires on this ESIA are listed in the tables below.

Table 1.3: Sponsor contact details

Scheme Proponent	Information
Name of Company	Uganda Investment Authority
Address	The Investment Centre TWED Plaza Plot 22B Lumumba Avenue PO Box 7418 Kampala Uganda
Telephone	+256 414 301000 +256 313 301100
E-mail	info@ugandainvest.go.ug
Website	ugandainvest.go.ug

Table 1.4: National ESIA consultant contact details

Scheme Proponent	Information
Name of Company	Queensland and Leeds Consulting Engineers
Contact person	Dr. Eng. Lammeck Kajubi
Address	27 Binayomba Road, Bugolobi, Kampala
Telephone	+256414268466 / +256 782580480
E-mail	Queensland.Leeds@engineer.com

Table 1.5: International ESIA consultant contact details

Scheme Proponent	Information
Name of Company	Mott MacDonald
Contact person	Cristobal Martinez
Address	Victory House Trafalgar Place Brighton BN1 4FY United Kingdom
Telephone	(+44) 1273 365 294
E-mail	cristobal.martinez@mottmac.com
Website	http://www.mottmac.com/

1.7 ESIA Team

The authors of the ESIA report are shown in Table 1.6.

Table 1.6: ESIA team

Name	Position	Training and Experience
• Lammeck Kajubi	ESIA Team Leader (Uganda)	• PhD (Renewable Energy), Atlantic International University, USA; • MEngSc Environmental engineering (Queensland, Australia) • BSc Eng (1.1 Hons), Makerere, Uganda • Certified Environmental Practitioner in Uganda • 20 years' experience.
• Tashobya Pamela Kwolekwa	Socio-Development Specialist (Uganda)	• MSc. Development Management (Norway) • BA. Environmental Management (Uganda) • Certified Environmental Practitioner in Uganda • 12 years' experience
• Dr Musa Manga	Water/ Wastewater Engineer (Uganda)	• PhD (Env. Eng) (Leeds, UK) • MSc. Environmental engineering (Leeds, UK) • BSc. Construction Management (Makerere) • Certified Environmental Practitioner in Uganda • 10 years' experience
• Solomon Muddukaki	Sociologist (Uganda)	• MA. Sociology (Makerere) • BA. Ed (Makerere) • 8 years' experience
• Dr Musenze Ronald	Civil/ Infrastructure (Uganda)	• PhD (Env. Eng) (Queensland, Australia) • MSc. Environmental engineering (Belgium) • BSc. Civil Eng (Makerere) • 10 years' experience
• Ivan Kibuka	Noise/ Air pollution Engineer (Uganda)	• MA. Sociology (Makerere) • BA. Ed (Makerere) • 8 years' experience
• Abel Mutyaba	E/OHS Specialist (Uganda)	• BSc. Env Eng (KYU) • OSHA Professional (Diploma), USA Academy USA • 4 years' experience
• Grace Baalikowa	Sociologist (Uganda)	• BA Sociology (UCU) • 11 years' experience
• Cristóbal Martínez	Project manager and Principal Environmental and Social Advisor (Mott MacDonald)	• BA Geography and spatial planning (sp. environmental and territorial planning) • MSc Environmental Intervention and Management • MA Management and Resolution of Conflicts: Mediation • 16 years' experience
• Frances Kilmurray	ESIA Lead environmentalist and Principal Environmental Consultant (Mott MacDonald)	• BSc (Hons), Environmental Geoscience, Edinburgh University • MSc (Dist), Environmental Pollution Control Management, Heriot-Watt University • Chartered Environmentalist (CEnv) • 16 years' experience
• Joshua Stroud	Senior Environmental Consultant (Mott MacDonald)	• BSc (Hons) Environmental Biology and Geography, University of St Andrews • MA Town and Regional Planning, University of Sheffield • Chartered Environmentalist (CEnv) • 7 years' experience
• Mark Sampson	Hydrologist (Mott MacDonald)	• BSc Geography (Hons) University of Leicester • Diploma of Imperial College • MSc Hydrology and Water Resource Management, Imperial College London • Chartered Environmentalist (CEnv) • 9 years' experience

Name	Position	Training and Experience
• Reena Bhavsar	Ecologist (Mott MacDonald)	• BSc (Hons) Zoology (Animal Science), University of Leeds, • MSc Applied Ecology, University of Exeter, • Student member of the Chartered Institute of Ecology and Environmental Management (CIEEM) • 4 years' experience
• Isabelle Kim	Social Safeguards Consultant (Mott MacDonald)	• BSocSc (Hons) International Development and Globalisation • MSc Development Management • Member of the International Association for Impact Assessment • 3 years' experience

2. Scheme Description

2.1 Scheme Overview

2.1.1 The KIBP

The KIBP comprises a major business and industrial park in Kampala, which would ultimately be the largest such development in Uganda.

The KIBP comprises four sectors (see Appendix 2.1 and the Masterplan in Appendix 1.1 for further details). These are proposed to be made up of a series of plots with land uses in accordance with the KIBP masterplan. These plots would be used by different operators and would be subject to their own ESIA requirements.

2.1.2 The Scheme

To enable individual plot development, infrastructure for the overarching KIBP is required. This infrastructure will include provision of road, rail, water (including supply, drainage and wastewater management), solid waste management, power supply, and communications. These infrastructure components comprise the assessed Scheme for this ESIA. As the development of privately-managed individual plots are subject to their own ESIA, they are not considered in this assessment.

The operational impacts of the operation upon the infrastructure of the KIBP on the basis of plot development forms part of the scope of this ESIA for the operational phase assessment.

Individual Scheme components that form the scope of this ESIA are presented in more detail in Section 2.4, with construction details provided in Section 2.5.

2.2 Need for the Scheme

The KIBP forms part of Uganda's aspiration to transform into a leading exporter in high-value markets in the region, as well as globally. It is considered that through establishing well-designed infrastructure and logistics platforms, they will serve as a launch-pad to support Uganda's economic development. Development of the KIBP will enable an organised development of industrial and commercial space and ensure there are fewer conflicts between residential and non-residential land-uses that are more prevalent in less-planned areas of Kampala.

It is envisioned that the KIBP will be a model business park, providing common-user facilities, offer collective services and outsourcing opportunities, and an improved business environment. This would help create a business hub for similar industries in a single location, providing economic efficiencies. The employment opportunities afforded by the KIBP would enable improved job opportunities and prosperity for potential future employees living in the Kampala region.

The KIBP cannot be developed without the provision of infrastructure that will enable people and goods to be transported to, from, and within the KIBP, clean water to be supplied and waste water to be removed, solid waste to be removed, drainage to be provided, and the KIBP to be powered and provided with telecommunications, as well as security. Without these fundamental features, the KIBP cannot operate, and they are therefore essential for the KIBP's development.

This essential infrastructure forms the Scheme which is assessed in this ESIA, with effects from the operation of the KIBP once the infrastructure is implemented also being considered.

2.3 Scheme Location and Layout

2.3.1 Location

The KIBP is situated in Wakiso (Kira Municipal Council) and Mukono Districts, on the eastern side of Kampala to the north of Lake Victoria (see Appendix 2.3). The KIBP is the largest of the industrial parks currently in operation in Uganda, being approximately 890 hectares (ha) in area.

As the KIBP is located in the Namanve area, in order to differentiate the KIBP from other business and industrial parks in the Kampala area, it is sometimes also referred to as the Namanve Park in other documentation.

More locally, the KIBP is located to the north and south of the Kampala-Jinja Highway and the Kampala-Mombasa railway. The Namanve River crosses the KIBP from north to south. The designated area comprises four Sectors: North, South A, B and C.

2.3.2 Topography

The proposed Scheme site stretches approximately 4km from west to east and about 8km from north to south and sits around 1,143 metres above sea level (m.a.s.l). The general slope is southwards within the Lake Victoria drainage basin. The land is mainly low-lying, surrounded by low relief, expressed by a difference of about 180 metres between hilltops and valleys.

The North and South A Sectors display the greatest variation in topography of the Scheme site. The landscape in these two sectors is typified by broad valleys, which are filled with fine sediments deposited by runoff water. The wetland area flows in a southerly direction draining into Kayobe swamp and opens out into Murchison Bay to the east of Port Bell.

I. North: The North Sector is situated north of the Kampala/Jinja road. The northern edge is characterised by the steep slopes of the eastern part of Buto hill. The River Namanve traverses through the site in a north south direction. The land slopes towards the river from the west and north west and into a central valley which is crossed by the (Kampala/Jinja) road. The gradient varies from 1:10 to 1:70.

II. South A: The South A Sector is situated immediately south of the Kampala/Jinja road. The Mombasa-Kampala railway traverses the northern end and most of this portion of the sector is relatively level with grades in the order of 1:90, whereas the eastern side slopes southwards towards the River Namanve at grades of between 1:25 and 1:75. An area of relatively high ground to the north-west slopes southwards in the direction of River Namanve, which traverses the Kampala/Jinja road via a culvert, opening out into South B Sector.

III. South B: The South B Sector is situated south west of South A Sector. This sector is bounded to the east by the western slopes of Kolo hill and to the west by the eastern slopes of Kirinya and Bukasa hills and to the south by the Kayobe swamp. River Namanve runs nearly through the centre of the sector and is flanked by low-lying land on either side. Much of this area lies below the estimated 100 year flood level for Lake Victoria, which has been calculated to be 1,136.30 m.a.s.l.

IV. South C (C1 and C2): The western side of South C Sector is bounded by the slopes of Kolo hill and the Kayobe Swamp, to the south by the Senyi Forest Plantation and to the east by high ground at Namiryango. A rectangular shaped section of the sector protrudes to the east and has a corridor of low lying land running down its centre in an east - south direction, bordered by the south eastern slopes of Nantabulirwa hill and the western slopes of Namiryango hill (Gibbs, 2002).

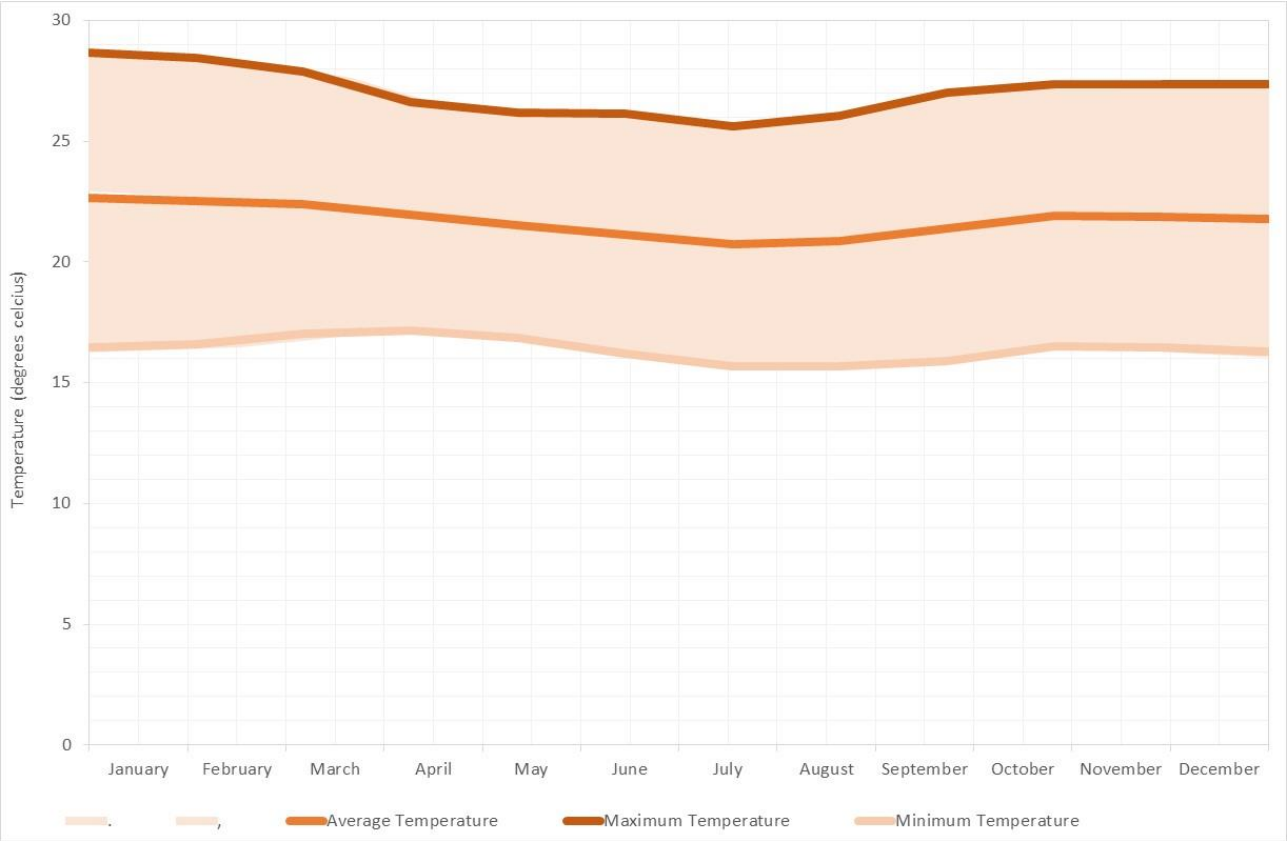
2.3.3 Climate

2.3.3.1 Temperature

As the KIBP is located near the equator, there is little fluctuation in the average temperature throughout the year. Temperatures range from average lows of 16˚C to average highs of 28˚C. January is the warmest month of the year, which averages 22.6°C (Climate-data, 2019). July has the lowest temperatures of the

year, which averages 20.7°C. Occasionally, hottest and coolest extremes of above 30°C and below 10°C are recorded in January and August respectively (EMA Consult Ltd, 2008).

Figure 2.1: Namanve Average Temperature Graph

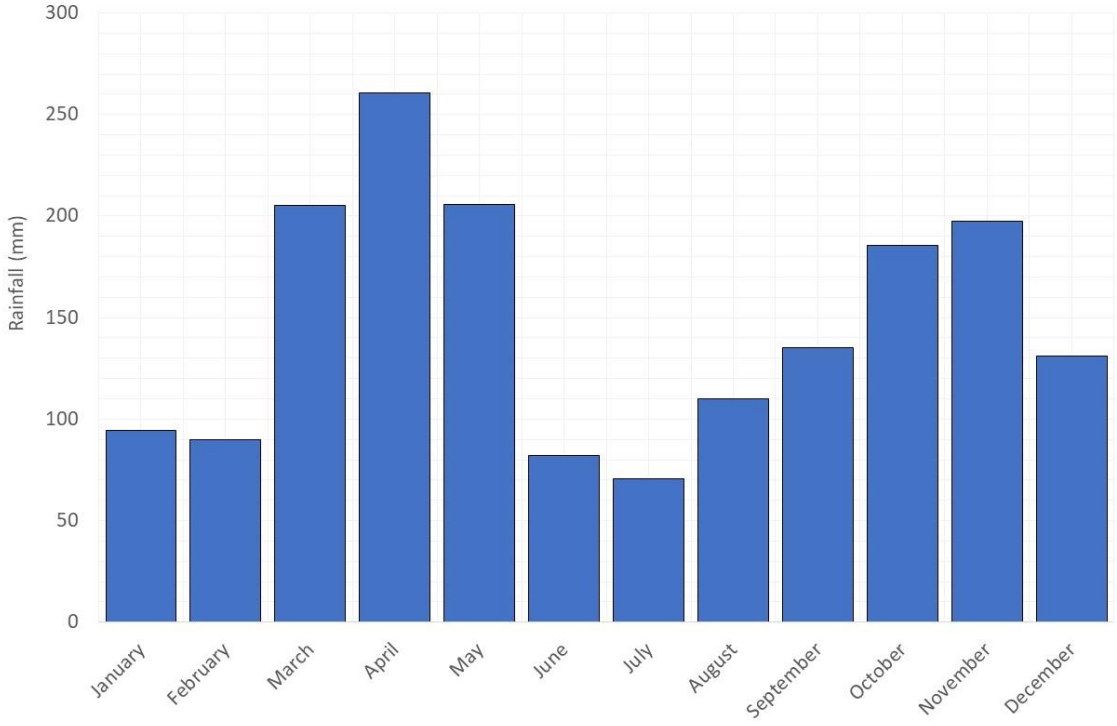


Source: Data from https://en.climate-data.org

2.3.3.2 Rainfall

Rainfall data for Kampala is presented in Figure 2.2 as a monthly profile. The climatic conditions within the Scheme site are strongly influenced by Lake Victoria. Kampala and the surrounding districts receive high rainfall from March to May, and September to December. Relatively drier months are January to February and June to August. The highest rainfall tends to be in April. Annual rainfall is between 1,750mm and 2,000mm (African Development Group Bank, 2018).

Figure 2.2: Monthly average rainfall in Kampala



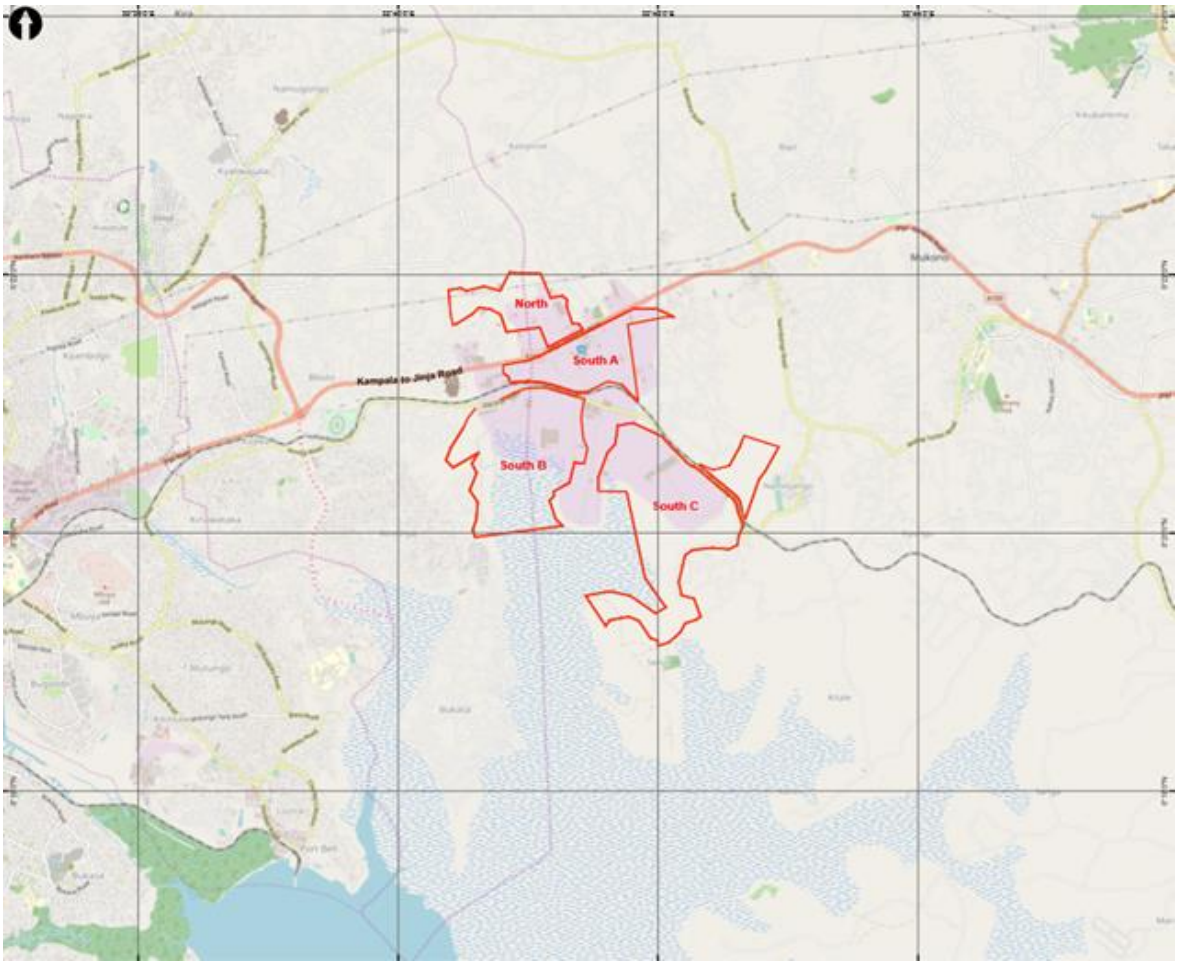
Source: World Bank Group

2.3.3.3 Wind

The KIBP is dominated by the southeast winds for around one third of the year. Westerlies and north-westerlies are very infrequent. Lake Victoria can have a bearing on the wind dynamics on a given day (EMA Consult, 2002).

2.3.4 KIBP Layout

Figure 2.3: KIBP location plan (KIBP boundary indicated by red line)



Source: Mott MacDonald, 2019

The KIBP has been divided into four Sectors in order to facilitate development going forward in a staged approach: North; South A; South B; and South C (Appendix 2.1). Further details on the Sectors are provided in Section 2.3.5.

Parts of the KIBP have already been in operation for several years, with a mix of businesses present across several areas of the site (see Appendix 2.4). The range of industries envisaged includes (noting that the developments within the individual plots are outside the scope of this ESIA):

- Business, Commercial and Leisure;
- Heavy and Light Industrial Business;
- Industrial rail-served;
- Logistics;
- Institutional;
- Agro-processing;
- Information Technology; and
- Civic.

The scope of this ESIA focusses on the development of the infrastructure to support the KIBP, as well as overarching operational impacts. The development of individual plots will be subject to their own ESIAs. The infrastructure considered as part of this ESIA consists of:

- Roads (including bridge works);
- Rail connection;
- Water (including water supply, drainage, and wastewater management);
- Solid waste management;
- Power supply; and
- Communications and ancillary infrastructure.

Further details on the Scheme components are provided in Section 2.4, with information on construction activities provided in Section 2.5.

2.3.5 Sectors

The sections below provide further information on each of the four Sectors.

2.3.5.1 North Sector

The North Sector is situated north of the Kampala-Jinja Highway. The sector is bordered by the Namanve Tree Seed Research Station and private land to the south-east. The Coca-Cola bottling factory and an area of private land forms the western boundary. The northern and southern peripheries of the sector are demarcated by private land. A gravel road runs parallel to the Tree Seed Research Station and continues northwards through the sector, running along the northern boundary. The northern tip of the sector tapers off into a narrow almost triangular shape and is marked by the steep slopes of the eastern part of Bbuto Hill.

River Namanve runs through the site in a north-south direction. The land slopes towards the river from the west and North West and into a central valley where the Kampala-Jinja Highway crosses.

It is proposed that this sector is primarily used for agro-processing industries in the completed KIBP. A new road junction on the south side of the sector will be built as part of the Scheme which will connect onto the Kampala – Jinja Road.

2.3.5.2 South A Sector

South A Sector is situated immediately south of the Kampala/Jinja Highway. The narrow-gauge Mombasa-Kampala railway runs along its southern boundary. To the east of the sector lies the Kabaka's (traditional king) land (i.e. the mailo land). A large portion of the South A Sector is relatively flat.

On the west of the sector, the land slopes southwards towards River Namanve. In this low-lying area, poor drainage is evident, particularly in the central valley where, respectively, the Kampala-Jinja Highway crosses and River Namanve enters the South B Sector.

Opposite the entrance to the Coca-Cola bottling plant, an area of relatively high ground is evident. It slopes eastwards towards the mailo land and south-west towards the River Namanve.

It is proposed that this sector will comprise information technology, commercial, and light industry sectors in the completed KIBP. This sector includes a new junction on the sector’s northern perimeter that links to the Kampala – Jinja Road. The southern perimeter of this sector connects to the Old Kampala – Jinja Road.

2.3.5.3 South B Sector

The South B Sector is situated immediately south of the old Kampala-Jinja road and south-west of South A Sector. The sector is bounded to the east by the western slopes of Kolo Hill and to the west by the eastern slopes of Kirinya and Bukasa hills and to the south by the Kayobe swamp.

The River Namanve, which is marked by low-lying land on either side, runs approximately through the centre of the sector. The flood risk of this area is considered further in the FRA presented in Volume IV.

The South B Sector is the location of the proposed Freight Village. This consists of shipping and transportation businesses who will make use of the access to both road and rail transportation, with rail sidings proposed. The sector connects with the Old Kampala – Jinja Road along its northern perimeter. It is proposed that the sector will be comprised of logistics, agro-processing, light industry, and heavy industries.

The southern part of the sector will also include the wastewater treatment works (WWTW) and separate solid waste management facility for the KIBP.

2.3.5.4 South C Sector

The South C Sector is divided into two portions: South C-1 (324 ha) and South C-2 (47ha). Both sectors are situated south-east of South A and B Sectors on the south of the railway line and the access road to Namiyango Village. The western side of this sector is bounded by the slopes of Kolo Hill and the Kayobe swamp. The southern and eastern boundaries are marked, respectively, by the Senyi Forest Plantation and the high ground at Namilyango Village.

A rectangular-shaped section of the sector protrudes to the east and has a corridor of low-lying land running down its centre in an east-south direction. The slopes of Nantabulirwa and Namilyango Hills form, respectively, the south-eastern and western boundaries of the central valley.

It is proposed that this sector will be comprise commercial, light industry, heavy industry, institutional, and civic uses. There is also an area which has been designated specifically for Small and Medium Enterprises (SMEs), located in Sector South C. It connects onto the Old Kampala – Jinja Road.

2.4 Scheme Components

2.4.1 Roads

2.4.1.1 Kampala – Jinja Road

The Kampala - Jinja road is one of Uganda's main communication axes, linking Kampala with Rwanda, Burundi, and Eastern Congo to the west, and with Nairobi and the port of Mombasa in Kenya to the east. The highway is therefore important for international freight transportation and currently suffers from significant congestion. It is predicted that traffic volumes will increase in the future, particularly as a result of the KIBP, leading to future increased levels of congestion.

The main access to the KIBP is situated in the Bweyogerere-Mukono segment of the Kampala-Jinja road. In order to avoid serious disruption of the Jinja road functionality as a result of the combination of the new traffic flow generated by the KIBP and the expected increase of the Jinja road traffic volume, a grade separated junction along the Kampala-Jinja Road is proposed as part of the Scheme (see Appendix 2.5). This junction would connect into the KIBP North Sector and South A Sector.

Two main junctions/access roads are proposed from the Kampala - Jinja Road. This will provide direct access to KIBP Sector South A through which all other Sectors can be reached. It will also provide direct access to the Freight Village, which is located in Sector South B. Traffic management will also be implemented, such as restricting right and left turns to reduce conflicting vehicle movements.

2.4.1.2 The Old Kampala - Jinja Road

The Old Kampala - Jinja Road (as shown on Figure 2.3) acts as an important alternative to the current Jinja Road as it can play a complementary role in accessing the KIBP both from Bweyogerere town, westwards of the KIBP where a new link to the northern bypass can be made, or from Seeta town at the east. This access route will be extended westwards to the Old Port Bell Road through the existing road that traverses the Mbuya, Kinawataka and Kirinya urban areas. Therefore, improvements to this road will be undertaken including widening (to 30m reserve width and 9m roadway width) and upgrades to at least bitumen class II standards.

This road will provide connections to the south (South B and South C Sectors), with Appendix 2.6 showing the details of the junctions. These will comprise (from west to east):

- An intersection providing access to the Freight Village;
- A central junction along the axes of the main KIBP dual-carriageway (which leads from the Kampala - Jinja (New) Road); and
- An eastern junction to provide access to the South C Sector area.

2.4.1.3 Primary Distributor Roads

Primary distributor roads form part of the Scheme in order to provide the most appropriate access within the KIBP. Each sector has a primary distributor road as a loop connected to the junctions.

These roads are designed to convey the required traffic with an approximately 35m reserve width. However, the road reserve width may be reduced at the detailed design stage based on the actual ground conditions and the availability of clear road corridors for these roads. Roads will feature segregation between pedestrians and vehicles, with drainage and buried services. The central strip will be planted with palm-trees recovered from the wetlands, where they are abundant.

The main primary distributor road links the South A Sector with the main junction to the Kampala-Jinja Road (northwards), and with the junction to the Old Kampala-Jinja road (southwards), as shown in green on Appendix 2.6.

2.4.1.4 Secondary Distributor Roads

The remainder of the access roads within the KIBP comprise secondary distributor roads, namely highways with a 25.8m width. The second cross-section remains with a single carriageway, serving the main streets. There are variable designs proposed, including with regards to pavements, that will be completed as part of the detailed design stage.

2.4.1.5 Perimeter Roads Around Security Enclosures

A new 4m wide gravel-track corridor is proposed to run along the boundaries of the KIBP and shall be delineated at the detailed design stage after opening up the boundaries of the KIBP. These are to link with the internal distributors, and the access shall be restricted to the KIBP's security staff for patrolling.

2.4.1.6 Operational Phase Traffic Levels

At this stage, operational-phase traffic levels from the KIBP are not fully known, but estimates have been made in order to inform the design and this assessment.

No detailed long-term traffic studies are available on either the Kampala-Jinja Road or the Old Kampala-Jinja Road. However, forecast traffic volume are available for the Kampala-Jinja Road from *the Pre-Feasibility Study for Strengthening and Improvement of Sections of the Northern Corridor Route (Malaba – Kampala – Katuna) EU Framework Contract. July 2007*. These figures show that in 2020, the total vehicles per day were predicted to be approximately 50,000 (an increase from approximately 22,000 in 2010) and will further increase to approximately 115,000 in 2030.

Whilst these numbers show a large increase, it is not clear of the basis of the forecast data, nor as to whether the assumptions around improvements on the Kampala-Jinja highway to enable in the road infrastructure to have the capacity for the high vehicle flows and if the KIBP have been included in the forecasts.

It is estimated in the KIBP Master Plan Final Report (see Appendix 2.2. in Volume III) that once functioning at full capacity the KIBP will have approximately 480 residential units, plus 350 industrial units. The report estimates that this will result in 2,000 residents and 15,000 workers which could increase up to 20,000 when the KIBP is fully operational. The 2002 and 2008 ESIAs assumed approximately half of the workers would travel to site using public transport (12-seater minibuses) which would lead to approximately 625 one-way movements to/from the KIBP per working day on the basis of 15,000 workers, assuming each minibus carries 12 people. This is likely to increase to 834 one-way movements to/from the KIBP per working day if the predicted 20,000 workers in the KIBP is reached. Others would be likely to cycle or walk to the KIBP.

The Masterplan suggests that the heavy truck flow is estimated to be 9,000 one-way trips per day to either the Freight Village or an industrial unit. It is unclear to what extent assumptions have been made on how much freight will use the railway.

2.4.2 Rail

The Scheme proposes connecting the KIBP to the future Standard Gauge Railway (which intersects the KIBP at the southernmost point, see Chapter 16 for further details, as assessed in the cumulative assessment). Sidings will be provided within the KIBP to enable the transporting of goods in to and out of the KIBP by rail. This new railway infrastructure is shown in Appendix 2.6. As the KIBP is planned to be a major industrial and logistics hub for the region, access to the trunk railway is considered essential in order to reduce the need for use of road vehicles.

The Freight Village is proposed to form the main logistics centre of the KIBP, and will therefore be the road/rail interchange for the KIBP. The design of the new sidings shall comply with the following standards:

- Track gauge = 1,000mm;
- Formation width on embankments = 15'0" (4.572m); and
- Formation width in cuttings = 17'0" (including side drains of width 450mm on either side).

It is important to note that this does not form part of the immediate works, but will be provided as part of the development of the wider masterplan. Therefore, there is limited information on this currently available, and would only be developed further as part of the implementation of the Standard Gauge Railway project.

It is intended that there will be a passenger commuting service, with one station and one wayside, interchanging with the KIBP's internal bus routes, although this falls outside the scope of the Scheme assessed in this ESIA.

2.4.3 Water

2.4.3.1 Potable Water Supply

The estimated water demand indicates an average operational water demand for the KIBP of 15,813m^3/day and a peak of 28,476m^3/day.

Some existing supplies are in place, and these are deemed to be sufficient only for the current site use. Therefore, in order to provide the necessary water supply and ensure continuous flow in the system as part of the continued development of KIBP, additional facilities are included as part of the Scheme.

A new water pumping station is currently under construction at Katosi, to the south of the KIBP in the Mukono District; this does not form part of the Scheme and is being developed independently (currently under construction). It is proposed to install pipelines that will link KIBP and the Katosi network. This would therefore provide the site's potable water supply.

In order to provide a reservoir, an existing tank in Seeta will be used. As this is at a height of approximately 1,240m above sea level, gravity can be used to service the KIPB, minimising the need for water pumps.

This design negates the need for a dedicated new reservoir to be developed for KIBP outside the site, although it is proposed that two reservoirs of a capacity of 1,750 cubic metres will be provided within the boundaries of the KIBP, and connected to the water supply system of pipes.

There is currently approximately 17km of water main installed on site at KIBP. The Scheme proposes a further approximately 15km of new water main.

Two transmission mains will be laid down and routed through the North Sector main road axis to reach the Old Kampala - Jinja Road through the central road of South A Sector. At the Old Kampala - Jinja Road, the transmission mains are split in two main lines, serving the remaining sectors.

The secondary water distribution network along the roads shall be connected in a loop system and provide the connections to the various premises and the provision for hydrants along its route.

2.4.3.2 Drainage

Drainage will be provided as part of the road design and construction, in the form of roadside ditches and covered drainage areas. The layouts and designs are shown in Appendix 2.7.

2.4.4 Solid Waste and Wastewater

A solid waste facility and waste water treatment works are included in the proposed project scope for the KIBP infrastructure. The solid waste facility will primarily serve as a waste transfer station and sorting facility and is intended to process waste arising from the operations of future and present occupiers of the park in addition to waste generated to the operation of the proposed development (i.e. the infrastructure element of KIBP). The wastewater treatment works will treat all effluent discharged by the industries and businesses located within the park.

The Scoping Opinion provided by NEMA (for further details, see Section 4.4 and Appendix 4.2) identifies that a separate ESIA is required to be undertaken for these facilities once the design for these elements of the project is sufficiently progressed, given that limited design detail is currently known. As such, a detailed assessment of the impacts and effects arising from the construction and operation of these facilities is not included within this ESIA. However, given their relevance to the remainder of the scheme under consideration as part of this ESIA, a high-level assessment of these elements is included in terms of construction and cumulative effects. The separate ESIA should take any identified impacts and effects related to the solid and liquid waste facilities into consideration and will provide a more detailed assessment.

Current information on these facilities is provided below.

2.4.4.1 Solid Waste

A solid waste facility will also be located adjacent to the WWTW in the South B Sector (as shown in Appendix 2.1). This will accept all solid wastes and sort the waste by classification i.e. solid waste; organic and inorganic. Thereafter, the waste will be transferred to the appropriate final destination i.e. a local secure landfill site or in the case of organic matter, a central composting facility.

The following proposed facilities will form part of the solid waste facility:

- Central collection facility;
- Central compositing facility;
- Hazardous/toxic waste facility;
- Solid waste containers; and
- Circa new 16km pipeline collecting and transporting solid waste from respective industries.

Opportunities for recycling and waste minimisation will be developed as part of a Site Waste Management Strategy which would form part of the operational phase Environmental and Social Management System, as implemented by the operator of the KIBP.

2.4.4.2 Wastewater

The Scheme includes a proposed sewerage system, which focusses on the development of a WWTW which will be located in the southern part of the South B Sector (as shown in Appendix 2.7). The rest of the KIBP will be linked to the WWTW using underground sewers that will use a mix of gravity flow and pumping stations. The WWTW is proposed to be located at the lowest part of the site to maximise the use of gravity, minimising the need to use pumps. Sewerage flows will largely follow the same routes as the internal roads.

The WWTW will be located near to the discharge point (the location of which will be determined at detailed design) and will reduce/remove the need for septic tanks individual plots. However, heavy or hazardous industries will be required to pre-treat their wastewater before it enters the KIBP sewerage system.

The WWTW will be capable of treating up to 18,000m^3 of sewage per day. A Sequence Batch Reactor (SBR) type facility is considered the most efficient for this type of treatment and is the process that will be assumed for the purposes of this ESIA. However, various options will be considered at the detailed design stage as more information regarding the likely nature of the wastes as well as the projected quantities becomes available.

2.4.5 Power Supply

The KIBP needs an external electricity supply in order to provide reliable energy to its businesses. It is proposed that the KIBP would have its own internal power distribution network that connects with the national network. Distribution would be by sub-surface cables, mainly located alongside roads. All the existing feeder lines have been delineated within the KIBP boundary or through public property (such as the Old Kampala - Jinja Road to feed the South B and South C Sectors); sections traversing private properties have been avoided.

There are sections of feeder lines that have been installed on some plots that are in operation (i.e. within private properties). Subject to agreement with the owners of these connections, it is intended that these plots are re-connected to the new power network as the construction progresses. This will ensure safe and metered connections are provided for all plots.

The new power supply for the KIBP will be organised as follows (as shown in Appendix 2.8):

- The lower section of the trunk feeder line in the North Sector has been moved to the main access road;
- The proposed main power distribution structure places the trunk feeder line originated from the substation in the South B Sector. Trunk feeder lines will feed the other sectors within KIBP; and
- From this main trunk feeder line, several feeder rings and antennae have been delineated along the main roads of the four sectors to feed the 32/0.433 kV in-door transformers. At the detailed design stage designs of power reticulation, street lighting, and the Supervisory Control and Data Acquisition (SCADA) power control system shall be prepared.

2.4.6 Communications and Ancillary Infrastructure

For all industries and services, the telecommunication network in the KIBP infrastructure needs to be an independent network that will act as a multi-service provider platform. It is anticipated that the KIBP telecommunication network will connect to the wider fibre optic cabling (for which the Ugandan Ministry of Information and Communication Technology (ICT) is responsible) at a connection point on the Kampala - Jinja Road. This connection will then run to the KIBP telecommunications control centre (in Sector South B) before wider distribution through the KIBP.

The Scheme proposes a system of a minimum of two ducts per access route and space to increase this to four on each side of the roads in the congested areas to facilitate high speed Internet and telephone access to KIBP. A dedicated fibre route be assessed for the KIBP and in particular in areas of commercial and SME industries.

In addition, telecoms facilities will be established and managed. Subject to detailed design, this is proposed for the centre of the South B Sector which will allow outer connections either by cable or satellite and to monitor the inner telecom network once it has been installed.

Within the KIBP, the proposed infrastructure to be installed on the access routes will include provision of the following:

- A dedicated optic fibre route;
- Ducts for Close-Circuit Television (CCTV);
- Public Lighting; and
- Spare ducts for future additional services.

2.5 Construction Activities and Components

The programme, activities and materials proposed as part of the construction phase of the Scheme are presented below, based upon information provided by Lagan-Dott JV and its partners. This information is liable to change slightly with the continuation of detailed design. However, such changes would be small in nature, and are not considered to affect the Scheme materially.

2.5.1 Construction Timeline

The KIBP includes some infrastructure which is already in place, such as some roads within the site. These aspects do not form part of the Scheme, and therefore are not included within the preliminary works programme outlined below.

Detailed design of the Scheme is currently underway and is due to finish in March 2020, working concurrently with some early construction works. The environmental and social constraints identified through the ESIA process will also help to inform the detailed design.

The preliminary works programme outlines that the construction phase is due to take place starting tentatively March 2020. The programmed duration is envisaged to be approximately 42 from scheme financing to hand-over. Furthermore, an additional 365 days will form the defects liability period.

These works are be broken down as follows:

- Site clearance: March 2020.
- Drainage works: March 2020.
- Roads and bridges: April 2020.
- Weigh bridge: May 2020.
- Kampala-Jinja highway overpass: June 2021.
- Water supply: June 2021.
- Sewerage network: July 2021.
- Waste treatment plant: June 2021.
- Power supply (including trench digging and cable laying): September 2021.
- Fibre optic and CCTV: December 2021.
- Street lighting: December 2021.
- Ancillary works: June 2022
- Final inspections and handover: March 2023.

2.5.2 Construction Methods

The Contractor will adhere to industrial good practices as detailed within the Method Statement for the construction works. The outline Method Statement is provided in Appendix 2.9 and this will be updated with any detailed design changes as the Scheme moves forward towards construction. A brief summary of this information is provided below.

It is proposed that the construction works identified above will be undertaken concurrently for all the Sectors of the KIBP. Therefore, all Sectors will be developed simultaneously and follow the same overarching programme.

The Scheme design is such that works will take place within the KIBP areas outlined, and so displacement of houses and businesses, either temporarily or permanently will not be required.

Health and safety will be key, and measures outlined in the ESMP and safety plans that will be prepared for the works. Many of the works will take place in areas accessible to the public (such as highway works), and a demarcation boundary will always be provided around the works to mitigate against public access to sites to protect their safety.

2.5.2.1 Construction of Highways and Related Infrastructure

The following works will take place for highways and associated infrastructure (with further details provided in the Method Statement in Appendix 2.9):

- **Site clearance:** Prior to any earthworks, site clearance will be undertaken using bulldozers, excavators and motor graders to clear areas and remove the topsoil. The remaining soil will be compacted using rollers or compacting equipment. The removed topsoil will either be stockpiled for future reuse or they will form part of the waste arisings.

- **Diversion to construct culverts:** Bypass culverts will be constructed using bulldozers, excavators, front wheel loaders, motor graders and compacting equipment or rollers. Waste soil will be transported away for stockpile using heavy tippers and will form part of the site's waste arisings if not able to be reused. These diversions will then enable creation of more room on site for other construction works.
- **Excavations of structures**: In some locations, structures may need to be removed to enable highway works and installation of new structures (such as the overbridge for the Kampala – Jinja Road). This will use a combination of excavators and manpower, and removed material will form part of the site's waste arisings if not able to be reused.
- **Borrow material and placing of fills:** Borrow pits are proposed to be located within the outskirts of the KIBP, with a haulage distance of up to 10km, although exact locations are not yet known (further studies on the chosen site(s) suitability will be undertaken in due course). Material from these sites will be transported using Heavy Goods Vehicles (HGVs) within the KIBP, using local highway infrastructure when needed. The borrow material will be spread using motor graders, compacted using pneumatic and vibrator rollers, and watered as required using bowsers.
- **Drainage and structural works:** Drainage works, concerning the installation of culverts and ducts, may precede the earthworks or be done alongside it. This will be done in advance of the construction of sub-base and base layers for the roads. Drainage and structural works will be done using excavators, front wheel loaders, and tipper trucks for transporting material to/from site.
- **Concrete works:** Concrete will be used for most of the structural works, especially bridge works. Concrete will be produced using the appropriate concrete mixing method. Concrete shall be transported for casting and then installed in location using appropriate equipment such as concrete dumpers or mobile cranes.
- **Earthworks:** Earthworks will be an ongoing activity alongside most of the preliminary works described above. Excavation works will use bulldozers, graders and excavators to perform cutting to attain the precise road profile, with tipper trucks used to transport material. Fill works will use material already cut from site, or material used from borrow pits. The material will be spread evenly in layers as specified, using motor graders, watered, and compacted by suitable rollers. Rock excavation will be carried out using breaking hammers or other suitable means. Blasting will be used when rock is found to be too hard for other methods to be used.
- **Road base and surfacing:** Crushed aggregate stone will be spread, levelled and shaped using motor graders, and compacted using pneumatic rollers. This will form the base layer to the roads. Asphalt concrete will then be used to surface the roads, using approved and cleaned coarse and fine aggregates and bitumen. The asphalt mixture will be delivered to site using tarpaulin-covered tipper trucks. For construction works on areas already used as highways (currently composed of dirt tracks), works shall be carried out in half-road widths starting with the left-hand side which will enable continued use by road traffic.
- **Masonry and pitching works, installation of gabions:** Alongside, or upon completion of the embankment works, the area shall be worked on to ensure the embankment's appropriate height and shape is adhered to, in order to make way for visible structures such as stone pitching, end structures, guard railings, and road signs. Gabions shall be installed where appropriate, with the creation of trenches, and then bedding in of gabions. Gabions will be stone-filled.
- **Ancillary road works:** Road furniture, including marker/kilometre posts, guardrails, road signage, road marking, speed bumps, kerbing, landscaping, and ripraps (where necessary) will be installed or applied at the end of the works in their specified locations. Upon completion of the road surfacing works, the finished road surface shall be swept as specified and allowed to settle for a period of approximately one month, and only then will road marking take place.
- **Box culvert construction:** Foundations will be constructed, comprising rock fill, mass concrete and concrete blinding. Steel reinforcement for the structure of appropriate size will be installed followed by concrete. The concrete will be agitated and vibrated vertically be a poker vibrator or approved means to avoid separation.
- **Precast concrete warning posts:** These will be cast on site and installed as appropriate.
- **Static weighbridge:** The weighbridge will be acquired with a specification of one platform scale as well as ancillary electronic equipment, remote display, external speaker system, traffic control lights and wiring. The static weighbridge installation will take place alongside other works and may be done

concurrently as the earthworks. Works will include: site clearance, earthworks, installation of the weighbridge, installation of base layer, drainage, road surfacing with bitumen and asphalt for the roads linking in to the weighbridge using the methods outlined above.

2.5.2.2 Construction of Other Infrastructure

The following works will take place for non-highways infrastructure (with further details provided in the Method Statement in Appendix 2.9):

- **Identification of the existing underground services:** Detectors and radar detectors shall be used to locate ducts buried in the working area. Where necessary, trial pits will be excavated. Excavation will be handmade. Continuous operation of the underground services shall be ensured throughout the construction.
- **Site clearance:** Any obstructions which may affect the execution of the works shall be removed. Clearance and grubbing shall include clearing the site of all vegetation and other objectionable material, preparation of the route and providing instructions to the community.
- **Excavation:** Trenches for the underground network, manholes, chambers and all other excavation required on site shall be excavated either by hand, or by ordinary mechanical plant, backhoe excavator, heavy extractor, or by bulldozer, depending on the depth of the excavation. If rocks are to be encountered, rock splitters are to be used. Topsoil and common backfill will be stockpiled in order to be re-used during the re-instatement activities. Permanently stockpiled material to be used by the Local Authorities for filling eroded areas and repairing rural roads. Excavated material shall be reused for bedding under the pipes and will be compacted with the vibrating plate or rolls. All surplus material will be disposed to approved tips. Backhoe loaders and tipper trucks will be used for the disposal operation. Following the installation of manholes, the walls shall be supported and backfilling will be undertaken to limit collapse. All outstanding excavated material will be hauled away from the site to spoil.
- **Dewatering:** As soon as groundwater is encountered in the excavated trenches, dewatering shall commence. Well point dewatering system, or some other suitable method shall be installed, coupled with a discharge line via a pump set.
- **Backfilling:** Every section of the pipeline shall be covered as soon as it has been lowered into the trench, following engineer's approval. Backfilling shall be carried out following layer compaction. Final top backfill shall be thoroughly wetted and compacted by rolling, tamping or vibrating plate with mechanical compacting suitable equipment. Backfilling will be done with imported gravel material. Following self-consolidation, imported material will be dumped, levelled and consolidated by mechanical compaction. Surface reinstatement shall be carried out to the standard which existed before excavation.
- **Pipe work:** The pipes will be transported on the trucks of suitable length. Unloading of pipes shall be done by means of cranes or other suitable equipment. The contractor is required to properly stack the ductile and uPVC pipes in storage yard. PVC bars, coils of polyethylene (PE) pipe and all rubber gaskets shall be stored in a ventilated location with a protection against UV sunlight. Valves shall be stored off ground and protected from dirt and moisture. All pipes have to be hydraulically tested, pressure tested and disinfected by the use of a solution of sodium hypochlorite or chlorine in water before commissioning. Air and water tests shall be done after backfilling of trenches.
- **Concrete works:** Batching of concrete will be carried out using weight batchers as well as volumetric batchers. Mixing of concrete will be carried out using mechanical concrete mixers, as well as mobile concrete mixers. Transportation of mixed concrete will be conducted by using unskilled laborers and wheel barrows, or buckets. Alternatively, a mobile concrete mixer, mobile crane or JCB backhoe loader will be used for transportation. The mechanical vibrators or poker vibrators will be deployed for compaction of concrete.
- **Rock Excavation:** Excavation in rock will be carried out using the blasting method where permitted, or compressed air rock excavation equipment or excavator.
- **Aggregate crushing:** Crushing plant is to be located in the proximity to the work area. Crusher dust is expected to be used as a substitute for sand.
- **Steel reinforcement:** The cutting, bending and fixing of steel will be carried out using manually/electrically operated steel cutters and benders.

- **Pumping stations:** The water pumping station shall be erected near water intake. In order to develop the pumping station, site clearance, excavation and works to the structure, including roof installation and roof drainage, are to be undertaken. A sump will be provided a short distance from the works for continuous dewatering of the works.
- **Water treatment plants:** To be developed, site clearance, excavation, concrete works, masonry works, metal works and carpentry and joinery works are required.
- **Wastewater treatment plants:** To be developed, site clearance, excavation, concrete works and ancillary works are required.
- **Service roads and gravel access road:** Site clearance, earthworks to level the terrain by using backhoe (JCB), compaction by vibrator roller, drainage works and sub-base and base course dressing will be undertaken. Borrow pits will be used to ascertain the gravity of the materials to be used and they will be reinstated by filling-up with surplus materials from excavation. Finally, pavement works are to be undertaken.
- **Railways:** New standard-gauge railways will be laid in the areas shown in Appendix 2.6. Land will be prepared for laying with levelling and ballast will be used where appropriate. Further details on these would become available as part of development of the Standard Gauge Railway, and these works do not form part of the proposed Scheme at present, but instead for part of the wider KIBP masterplan.
- **Landscaping:** Planting of grass, trees and bushes will be conducted. To facilitate their growth, continuous watering will be done.
- **Electrical works:** These will be undertaken to ensure that appropriate and safe power supplies are installed for the KIBP. Cables will be earthed, and external cabling will use cabling tubes or conduits laid under the surface. The earthing network will be connected to the main supply in the transformer hub or electrical room.

2.5.3 Construction Hours

It is proposed that working hours will be from 08:00 to 17:00 Monday to Saturday, with special consideration made for emergencies or special activities whereby works would take place outside of those hours. These situations would be agreed with the relevant authorities in advance on a case-by-case basis.

2.5.4 Construction Materials

The Feasibility Report 2018 provides information on the proposed construction materials for the Scheme. These are shown in Table 2.1 and may be subject to change as part of detailed design.

Table 2.1: Construction materials

Material Description	Units	Quantity
Road Network and Bridge		
Primary Distributor road (Design and developing of approximately 30-metre width with 2 x 8 metre carriageways, with 50 mm Asphalt Pavement on 200 mm Crushed aggregate base on approximately 300 mm Natural gravel subbase on required gravel fill, Rock fill in the swamps, Construction of Box/Pipe culverts, Construction of Open/closed drain channels, 2 x 2 metre shoulders etc)	KM	0,78
Primary/Secondary Distributor road (Design and developing of approximately 24-metre width with 2 x 4.5 metre carriageways, with 50 mm Asphalt Pavement on 200 mm Crushed aggregate base on approximately 300 mm Natural gravel subbase on required gravel fill, Rock fill in swamp sections, Construction of Box/Pipe culverts, Construction of Open/closed drain channels, 2 x 2 metre shoulders etc)	KM	33,77
Secondary Distributor road (Design and developing of approximately 20 metre width with 2 x 3.5 metre carriageways, with 50 mm Asphalt Pavement on 200 mm Crushed aggregate base on approximately 300 mm Natural gravel subbase on required gravel fill, rock fill in the swamp sections, construction of Open/Closed drain channels, 2x2 meter shoulder etc)	KM	7,8
Structures (overpass on Kampala - Jinja highway)	PS	1
Water Supply		
uPVC pressure pipes to BS 1452:2009, with flexible joints all to PN 16, DN 200mm, laid in trench to the different depths	LM	5130
uPVC pressure pipes to BS 1452:2009, with flexible joints all to PN 16, DN 150mm, laid in trench to the different depths	LM	5400

Material Description	Units	Quantity
uPVC pressure pipes to BS 1452:2009, with flexible joints all to PN 16, DN 100mm, laid in trench to the different depths	LM	2100
uPVC pressure pipes to BS 1452:2009, with flexible joints all to PN 16, DN 80mm, laid in trench to the different depths	LM	1000
Bends, sockets, couplings, Tee's, Flange adopters, Tapers etc DN 80 - DN 300	LS	1
Gate valves, Air valves, Fire hydrants, Water meters and other fittings etc. DN 80 - DN 300	LS	1
Provide and lay DI pipes on pedestals in swamp sections	LM	1492
Pedestals for pipe laying above surface with various depths	N/A	N/A
Depth between 1.5m to 2 m	Number	155
Depth between 2.0m to 2.5m	Number	185
Supply and install 1,750 CM nominal capacity hot galvanised pressed steel sectional tank with external flanges with all fittings	Number	2
O & M Manuals	Sets	3
Sewerage Network		
uPVC drain pipes, to BS EN 1452:2009 DN 200mm, PN 16, laid in trench to the following depths:		
Depth not exceeding 1.5m	LM	3200
Depth not exceeding 1.5m-2m	LM	3350
Depth not exceeding 2.0m-2.5m	LM	9013
Depth not exceeding 2.5m-3m	LM	1950
Depth not exceeding 3m-3.5m	LM	2875
Sewerage treatment plant	LS	1
Rock filled gabion mattress along swamps and river channel	CM	511
Mild steel handrails to BS 4211, galvanised to BS 729 complete and fixed to the reinforced concrete structure	LM	749
Flexible road sub-base of granular materials as specified and stabilised and compacted to depth 150mm - 200mm	SM	3604
As Build Drawings	Item	1
Waste Treatment Plant		
uPVC drain pipes, to BS EN 1452:2009 DN 200mm, PN 16 , laid in trench to the following depths		
Depth not exceeding 1.5m	LM	1851
Depth not exceeding 1.5m-2m	LM	3750
Depth not exceeding 2.0m-2.5m	LM	9040
Depth not exceeding 2.5m-3m	LM	2210
Depth not exceeding 3m-3.5m	LM	3475
Solid treatment plant	LS	1
Rock filled gabion mattress along swamps and river channel	CM	24,500
Mild steel handrails to BS 4211, galvanised to BS 729 complete and fixed to the reinforced concrete structure	LM	945
Flexible road sub-base of granular materials as specified and stabilised and compacted to depth 150mm - 200mm	SM	3597
uPVC pipe with flexible joints to laid in trench (4 x 30 KM)	LM	120,000
Supply and laying of 33 Kv single core cable 300 mm square	LM	30,000
Road crossings for the following pipes (Breaking up, temporary and permanent sleeves etc.) Diameter not exceeding 300mm ND	LM	183
Fibre Optic Services and CCTV Services		
uPVC pipe with flexible joints to laid in trench (2 x 88 KM)	LM	176,000
uPVC pipe with flexible joints to laid in trench (1 x 88 KM)	LM	88,000
Supply and erection of CCTV cameras and accessories including Client monitoring systems, Switches, Transmission etc	Number	155
Street Lighting (Solar)		
uPVC pipe with flexible joints to laid in trench (1 x 88 KM)	LM	88,000

Material Description	Units	Quantity
Supply and Installation of complete and operational remote-controlled street lighting system (LED Luminaire, Breakaway pole, solar controller, underground battery box, Solar panel assembly, GSM mould etc	Number	1,760
Supply and laying of 25mmsquare XLPE cable	LM	88,000
Traffic signal controller fitted with a minimum of 16 phases and capacity of 32 Phase, supplied fully configured, with Dimming Transformer, Remote Monitoring system and with 3G cellular and optic fibre connection capacity, accessible on site by remote laptop and HHT; including Traffic signal poles, Moving Vehicle detectors with individual lane monitoring, Stop line vehicle detector, Cable duct, cabling and connection to the power utility	Number	2

Source: Laggan-Dott, 2019

2.5.5 Construction Plant

It is proposed that the following plant will be used:

- Bulldozers;
- Excavators;
- Backhoe excavator;
- Heavy extractor;
- Compressed air rock excavation equipment;
- Rock splitters;
- Crushing plant;
- Steel cutters and benders;
- Weight and volumetric batchers;
- Concrete mixers;
- Wheel loaders;
- Motor graders;
- Compacting rollers;
- Pneumatic and vibrator rollers;
- Vibrating plate;
- Vibrating rolls
- Mechanical and poker vibrators;
- Bowsers;
- Tipper trucks;
- Backhoe loaders;
- Concrete dumpers;
- Mobile cranes;
- Heavy duty tipping trucks; and
- Site service vans.

Other small plant may also be required in addition to the above.

2.5.6 Quarrying and Borrow Pits

2.5.6.1 Quarry

The Scheme will make use of existing quarry facilities that are located in the Ssemuto – Kapeeka area, which are owned and operated by the Contractor, as shown in Appendix 2.10. These facilities have been identified as suitable to supply materials for the Scheme and construction traffic routes identified that allow materials to be safely transported to the site using primary roads.

2.5.6.2 Borrow Pits

Local borrow pits around the KIBP are proposed to be used, with agreement with any land owners. Further details on these are not currently available, however it is proposed that borrow material would not be taken from sites with a contamination risk, and would be of a similar quality to where the fill is required. Sustainable use will ensure the sites of borrow pits are not degraded and restoration can take place.

2.5.7 Construction Vehicles and Routes

The construction phase has the potential to increase traffic on nearby roads, notably the Kampala – Jinja trunk road (A109) and the old Jinja Road The full requirement for construction vehicles is not fully known. However, it has been estimated that at the peak of the construction period which would last for a period of approximately 18 months there would be a total of 1,283 additional vehicle movements per day (as shown in Table 13.6). During the remainder of the construction period there would be significantly lower volumes of construction traffic.

Construction vehicles that are accessing the KIBP from outside the immediate vicinity will use routes that avoid residential streets where possible, using primary roads which already experience larger vehicle movements with reduced impacts upon its residents.

The final traffic routes will be confirmed as part of detailed design, as captured within the finalised ESMP.

2.5.8 Construction Camps and Compounds

The Contractor will use the UIA-designated areas for use as a construction camps and compounds. These will be as follows:

- Compound 1 - Primarily for: site offices, welfare facilities, material storage, laydown areas for equipment, and parking. This will act as the main camp for the site, and will act as the site's head office, including its management.
- Compound 2 – Primarily for: material storage.
- Compound 3 – Primarily for: canteen, clinic, and worker recreational activities.

In addition to the above, there is an existing mechanical workshop which will be used for the construction. This is located just outside the KIBP Scheme boundary, the location of which is shown in Appendix 2.1.

Accommodation will be provided in the vicinity of the KIBP for workers from outside of the Kampala area. For works sourced more locally, it is expected that they will commute from their homes.

Site compounds will be secured, and security staff will regularly patrol the working areas. It is proposed that a peak of up to 40 security staff would be employed for the construction of the Scheme.

2.5.9 Staff and their Welfare

Staff for the Scheme will be sourced from within Uganda firstly a foremost, with workers from outside Uganda considered when there is a skills gap. It is currently envisaged that up to approximately 600 staff would be employed on site at any given time during most phases of the programme, but in particular the earlier phases during the first year which would be the most labour-intensive.

A staff clinic will be established which will provide medical services and welfare to workers. Services that will be available to workers will include: testing for diseases, counselling, and AIDS awareness education.

All permanent workers will be employed under conditions that comply with Ugandan national law, as well as good industrial practice.

2.5.10 Temporary Road Diversions

Temporary road diversions will be needed in order to enable works to highways to be undertaken. It is envisaged that these would be required for the overbridge construction on the Kampala – Jinja Expressway (between the Northern and Southern Sectors of the KIBP). Traffic diversions here will be minimal, with traffic diverted onto adjacent roads once slip-roads are built.

Local Authorities and the police shall be engaged by the Contractor with regards to any temporary closures and diversions that may be required in order to agree to these, implement the appropriate traffic management (as required) and address any environment and social concerns.

Within the KIBP, it is planned for highways works on existing roads to be undertaken in a manner which allows for half of the road width to remain open, enabling single-file traffic flows to continue around the road works area through employment of traffic management.

2.6 Scheme Alternatives

As part of the ESIA process, it is necessary to give consideration to the alternatives to the Scheme's final design, and consider the overarching environmental implications of the alternative design. These are presented below. Given many areas of the KIBP are already developed, the scope for a range of alternatives, such as with location, is limited as the current layout needs to be adhered to, and disruption during the works minimised. Removing the need for land take also means many alternative options were not developed further that would have required areas outside the KIBP boundary to be used.

2.6.1 Do-Minimum Alternative

A do-minimum alternative would see the KIBP maintained in its current state without the infrastructure upgrades proposed as part of the Scheme, with standard maintenance on the existing facilities going forwards.

This alternative was discounted on the basis that it would not meet the needs of the UIA and Ugandan Government to facilitate economic development through attracting investors and developers to the country through industrial parks such as the KIBP. The current infrastructure would not allow for the proper development of the KIBP and therefore would not help meet the objectives for improving the economic conditions and providing employment opportunities.

On this basis, a do-minimum alternative was discounted, and therefore it was determined that there was a need for a scheme.

2.6.2 Highways Alternatives

An alternative highway design that would have had kerbed edges, raised pedestrian footpaths, underground drainage and increased blacktop depths was considered. This would have provided more segregation between pedestrians and road vehicles. However, whole-life costing was considered, and this resulted in the selected open-channel drainage solution being used as it is easier to maintain during the operational phase. The lower whole-life cycle costing aligns with sustainability objectives to consider longer-term implications of design selections

Alternative road finishes were considered, such as bitumen sealed roads. These would have resulted in a poorer quality of finish for the highways, and this was therefore not taken forward. The poorer-quality finish would have resulted in likely increased maintenance costs during the operational phase, negatively impacting upon the whole life cost of the Scheme.

3. Policy, Legal and Institutional Framework

3.1 Overview

This chapter discusses policy, legal and institutional framework within which the ESIA was conducted. National regulations are discussed along with relevant international agreements and conventions to which Uganda is a party. Key legislation governing conduct of ESIA study in Uganda are the National Environmental Act (2017), and Environmental Impact Assessment Regulations (1998). The National Environmental Act established National Environment Management Authority (NEMA) giving it a responsibility to ensure compliance with the ESIA process and guidelines in planning and execution of development projects.

3.2 Policy Framework

3.2.1 Second National Development Plan 2015/16 –2019/20

The Vision 2040 mission on industrialisation is being implemented through the Second National Development Plan 2015/16 – 2019/20 (NDP II) (see Chapter 10 of that report). A Public-Private Partnership (PPP) is proposed, with the public sector "… responsible for formulation and implementation of policy and regulatory frameworks to facilitate a conducive working environment for investment and doing business within the country". This is in line with the national economic policy for a private-sector led approach.

NDP II recognises that industrialisation will be an essential catalyst in order to improve economic conditions in Uganda. Therefore, Uganda will have appropriate policies, legal framework and programs to eliminate the main challenges impeding growth, including regional industrial parks.

Relevance to the Scheme: NDP II recognises the importance of industrialisation, including development of associated infrastructure such as industrial parks, to national economic development.

3.2.2 The National Environment Management Policy, 1999

The goal of this policy is the promotion of sustainable economic and social development, giving consideration to the needs of future generations. ESIA is one of the tools it considers necessary to ensure environmental quality and resource productivity on long-term basis. It calls for integration of environmental concerns into development policies, plans and projects at national, district and local levels. The policy requires that projects with potential to have significant adverse impacts undertake an ESIA before the commencement of works.

Relevance to the scheme: This policy enabled the enactment of the National Environment Act, Cap 153 (or NEA-1) which made ESIA a legal requirement for eligible projects. NEA-1 has since been replaced with NEA-2 that came into force in 2019. NEA-2 provides regulatory control for various industrial operations, materials (chemicals and plastics), waste and emissions.

3.2.3 The Wetlands Policy, 1995

The national policy on conservation and management of wetlands aims at curtailing pollution and loss of wetland resources. The policy seeks to balance development with the conservation of the wetlands and environment as a whole. 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'.

Relevance to the Scheme: This policy is relevant in so far as there exist swaths of wetlands in the southern portions of KIBP whose protection from pollution and direct impacts is essential for overall ecological and water purification functions.

3.2.4 The National Water Policy, 1999

This policy is important with regards to the water supply both during construction and operation of the KIBP and their potential effect on either water quality or quantity. The objective of the policy is to provide guidance on development and management of the water resources in an integrated and sustainable manner 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.

Relevance to the Scheme: The policy was therefore set to:

- Control pollution and promote the safe storage, treatment and disposal of waste, which could pollute local water sources and impact public health;
- Promote rational use of water; and
- Promote orderly development and use of water resources for purposes other than domestic including industrial use.

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

This policy is aimed at restricting the continued loss of wetlands and their associated resources and aims to ensure that benefits derived from wetlands are sustainably and equitably distributed to all people of Uganda. The wetlands policy calls for:

- No drainage of wetlands unless more important environmental management requirements supersede;
- Sustainable use to ensure that benefits of wetlands are maintained for the foreseeable future;
- Environmentally sound management of wetlands to ensure that other aspects of the environment are not adversely affected;
- Equitable distribution of wetland benefits; and
- The application of environmental impact assessment procedures on all activities to be carried out in a wetland to ensure that wetland development is well planned and managed.

Wetland related issues have been incorporated into the National Environmental Statute 1995. The Wetlands Policy is strengthened by a supplementary law specifically addressing wetland concerns. Wetland resources are regarded as forming an integral part of the environment and is recognised that present attitudes and perceptions of Ugandans regarding wetlands be changed. Wetland conservation requires a co- ordinated and cooperative approach involving all the concerned people and organisations in the country, including the local communities.

Within the context of the guiding principles, the National Wetlands Policy set five goals, to:

- Establish the principles by which wetland resources can be optimally used over time;
- End practices, which reduce wetland productivity;
- Maintain the biological diversity of natural or semi-natural wetlands;
- Maintain wetland functions and values; and
- Integrate wetland concerns into the planning and decision making of other sectors

Relevance to the Scheme: The Scheme has the potential to impact upon wetland areas adjacent to the KIBP. Therefore, this will need to be considered as part of this ESIA, including mitigation and measures to be incorporated into the ESMP.

3.2.6 The Uganda National Land Policy, 2013

The Uganda National Land policy provides a framework for articulating the role of land in national development, land ownership, distribution, utilisation, alienability, management, and control of land. The Land Policy has a specific objective that seeks to ensure sustainable utilisation, protection and management of environmental, natural and cultural resources on land for national socio-economic development. It seeks to ensure that all land use practices and plans conform to principles of sound environmental management, including biodiversity, preservation, soil and water conservation, and sustainable land management. Section 6.7, item 140 of the policy promotes optimal and sustainable use and management of environment and natural resources for the present and future generations.

Relevance to the Scheme: The Scheme will need to ensure there is sustainable land usage, with ownership considerations forming part of the LRP.

3.2.7 Industrialization Policy

Uganda's National Industrialization Policy (2004–2009), and its subsequent amendments, promotes the development of environmentally-friendly industries and activities to be carried out to raise awareness to entrepreneurs on environmental issues. The Ugandan Government promotes policies and programmes for energy efficiency, industrial pollution control, good land-use and management of toxic and hazardous waste.

Relevance to the Scheme: The following attributes of the policy render the policy relevant to the Scheme:

- ***Cluster development policy:*** Strategic policy drives include Spatial Development Initiatives, including *industrial parks* and export promotion zones (EPZs).
- ***Reduction of cost of doing business:*** Work with the Medium-Term Competitiveness Strategy (MTCS) to ensure that the cost of doing business declines.
- ***Investment promotion and generation:***
  - Devise programmes and strategies to attract leading global firms to provide the nucleus for cluster development.
  - Work with the UIA to develop and strengthen linkage between investment promotion, cluster development and value addition initiatives.

On cross-cutting issues, Section 2.4 of the industrialization policy recognises evidence that HIV/AIDS and malaria present a negative impact on industrial production. Noting that about 30-40 per cent of absenteeism at work is related to HIV/AIDS and Malaria, there is evidence that HIV/AIDS and malaria present a negative impact on industrial production. Therefore, in the long run HIV/AIDS and Malaria pose a risk to the supply of industrial labour.

3.2.8 The Uganda Vision 2040

The Vision 2040 is conceptualised around strengthening the fundamentals of the economy to exploit the opportunities available in the country. Industrialisation is one of the opportunities cited in Vision 2040 with the understanding that China will free up 85 million labour-intensive manufacturing jobs by 2020. It is posited that Uganda will build "a stronger and more competitive industrial base over the Vision period (2010 – 2040)" through; i) developing industries that utilise the local potential, ii) attracting industries that can be relocated from fast emerging economies, iii) offshoring industries, iv) establishing economic lifeline industries, and v) investing strategic industries. Apart from agro-based industries, the other immediate targets are iron and steel together with development of the oil and gas industry. Future plans also include setting up of a Hi-Tech city as a hub for digital industries, developing and upgrading electronic and micro-electronics, machine tools, higher technology industries (transport and automobile), aerospace industry, nano and bio-technology industries.

Relevance to the Scheme: Vision 2020 notes that the strategy for achieving targets it set includes setting up sector-specific cluster-based industrial zones, industrial parks / clusters and Special Economic Zones.

3.2.9 Uganda National Land Use Policy, 2006

The overall goal for the national land use policy is "To achieve sustainable and equitable socio-economic development through optimal land management and utilization in Uganda". Some of the specific goals for the policy include to:

- Promote land use activities that ensure sustainable utilisation and management of environmental, natural and cultural resources for national socio-economic development; and
- Ensure planned, environmentally friendly, affordable and well-distributed human settlements for both rural and urban areas.

Wetlands are one of the important land uses in Uganda, and yet are very susceptible to destruction through cultivation and other developments on marginal lands and fragile ecosystems. This policy was developed to

make provision for the sustainable utilization of wetland resources, together with the National Environment Act and National Wetlands Management Policy.

Relevance to Scheme: The land required for this Scheme implementation will be obtained and used in line with the principles of this policy, with particular consideration for wetlands management since the KIBP has wetlands covering a portion of its southern part.

3.2.10 National Occupational Health and Safety Policy

This policy seeks to:

- Provide and maintain a healthy working environment;
- Institutionalize Occupational Health and Safety (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 sector regulations and policies. The OHS Policy also takes into consideration 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 Scheme: This policy will be especially relevant for OHS of construction works and subsequently, operation and maintenance activities within the industrial park. The policy will also be relevant in mitigation measures that protect the public from health and safety impacts of construction and operation activities within the KIBP.

3.2.11 HIV / AIDS Policy, 1992

Current effort to combat HIV / AIDS is characterised by a policy of openness by the Ugandan Government and this has been emulated by civil society, political and social institutions and workplaces. The Ministry of Health, together with the Ministry of Gender, Labour and Social Development, encourage 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 organisation to discuss their concerns and obtain information.

The policy defines the following:

Role of employer

- Formulation of an HIV / AIDS policy around the principle of non-discrimination, equality, confidentiality, care and support for the project;
- Develop an equitable set of policies that are communicated to all staff and properly implemented, including protection of the rights at work and protection against any discrimination at work;
- Develop a step-by-step action plan taking on all the legal, ethical, social and economic aspect;
- Identify the factors that influence HIV / AIDS transmission in terms of organisational, structure/activities, examine existing workplace practices and policies; establish the real and/or potential impact of HIV / AIDS on the company and its work force;
- Ensure that induction programs for new workers includes training on HIV / AIDS;
- Initiate and develop HIV / AIDS prevention and care programmes, designed not only to protect the infected workforce, but also to take into account the rights and problems of those living with HIV / AIDS;
- Provide and maintain as far as is practicable, a working environment that is safe and without risk to the health of its workers, including occupational transmission of HIV;
- Ensure that the rights of workers with regard to HIV / AIDS and the remedies that are available in the event of breach of such rights, become integrated into existing grievance procedures;

- Responsible for the implementation of this policy; and
- Mainstream HIV / AIDS activities into the workplace policies and programs.

Role of employees:

- Initiate dialogue on HIV / AIDS between employers and workers and to actively participate in the development and implementation of workplace prevention programmes i.e. awareness campaigns, dissemination of information and education, care and support;
- Participate in the development of workplace policies; and
- Participate in mainstreaming of HIV / AIDS into the workplace policies and programs.

Relevance to Scheme: Noting that about 30-40 per cent of absenteeism at work is related to HIV / AIDS and Malaria, there is evidence that HIV / AIDS and malaria present a negative impact on industrial production. Therefore, HIV / AIDS and Malaria pose a risk to the supply of industrial labour.

3.2.12 National Gender Policy, 1997

The Uganda National Gender Policy (NGP) was first developed in 1997 and revised in 2007 as a confirmation that the Ugandan Government is committed to take actions that will bring about more equal gender relations. 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. The policy was designed to guide and direct at all levels of planning, resource allocation, and implementation of development programmes with a gender perspective.

Relevance to Scheme: The policy recognises the role of different genders in development projects. Therefore, women should have equal consideration for available jobs.

3.2.13 Energy Policy, 2001

The Energy Policy recognises significant potential for energy efficiency through improved use in industry, commercial buildings and the transport sector. It notes that expenditure on energy constitutes a large proportion of the country's GDP and it is necessary to emphasise efficient use of energy. Fuel substitution is important to reduce negative impact of the use of some fuels on the environment and to reduce the cost of energy services. For instance, substitution in the use of electricity for water heating will reduce stress on grid power and lower cost of power used by the hotel, especially in the post-construction phase.

Relevance to Scheme: This policy will require efficient use of energy both during construction and operation of the KIBP.

3.3 Legal Framework

3.3.1 The Constitution of the Republic of Uganda, 1995

The Constitution of Uganda (1995, amended 2005) defines the role of government in development. It provides that "The State shall take all necessary steps to involve the people in the formulation and implementation of development plans and programmes which affect them" (National Objectives and Directive Principles of State Policy, Section X). It also provides with regards to the "Role of the State in development" that "(i) The State shall give the highest priority to the enactment of legislation establishing measures that protect and enhance the right of the people to equal opportunities in development; (ii) The State shall stimulate agricultural, industrial, technological and scientific development by adopting appropriate policies and the enactment of enabling legislation" (Section XI).

The Constitution under Section XII (Balanced and equitable development) provides that: "(i) The State shall adopt an integrated and coordinated planning approach; (ii) The State shall take necessary measures to bring about balanced development of the different areas of Uganda and between the rural and urban areas. (iii) The State shall take special measures in favour of the development of the least developed areas." Under Section XIV (General social and economic objectives), "the State shall endeavour to fulfil the fundamental rights of all Ugandans to social justice and economic development and shall, in particular, ensure that: (a) all developmental efforts are directed at ensuring the maximum social and cultural well-

being of the people; and (b) all Ugandans enjoy rights and opportunities and access to education, health services, clean and safe water, work, decent shelter, adequate clothing and food security.

In addition, Article 39 of the 1995 Uganda Constitution provides that every person in Uganda has a right to a clean and healthy environment and Article 245 enforces the protection and preservation of the environment, from abuse, pollution and degradation, to manage the environment for sustainable development and to promote environment awareness.

Relevance to the Scheme: While it fosters socio-economic development, Uganda's constitution also cognises the need that this development should be in consonance with environmental sustainability.

3.3.2 National Environment Act, Cap 153

In 2017 Uganda developed a bill aimed to update its 24-year National Environment Act (Cap. 153) enacted in 1995 (the "NEA-1"). This update was necessary to make NEA-1 contemporaneous with prevailing developments in the energy sector, the planned infrastructure of a refinery and pipelines in the oil and gas space, the imminent production of oil, increasing urbanisation and the consequent pressures on land, and climate change. NEA-1 developed in 1995, had become obsolete in time and long needed an overhaul to address the new social-environmental and climate challenges.

The National Environment Act 2019 (the "NEA-2") repeals and replaces the NEA-1. It primarily addresses emerging environmental issues including climate change, the management of hazardous chemicals, environmental impacts of oil and gas activities and the management of plastics. It also establishes a specialised unit, the Environmental Protection Force, to handle enforcement. The NEA-2 creates new offences and greatly enhances the penalties both in monetary fines and custodial sentences.

Other provisions of note include extensive requirements for management of chemicals and product control, a comprehensive list of projects requiring environmental and social impact assessments, and the introduction of an express penalty scheme for offences under the NEA 2019. In the new NEA-2, a requirement for an ESIA now arises from location of a project in an environmentally sensitive location rather than only from project attributes. NEA-2 also prohibits the use of plastics under 30 microns and prescribes a list of the permitted uses of plastics and plastic products.

Relevance to the Scheme: NEA-2 continues to mandate NEMA with responsibility for in-situ and ex-situ conservation of biological fauna and flora resources either on land or in water. The Act provides for environmental and compliance monitoring, laboratory analysis, environmental audits, inspections, environmental restoration orders, environmental improvement notices and environmental compliance agreements. NEMA will therefore be responsible for review, approval of this ESIA and monitoring construction and operation of the industrial park. Indeed, NEMA has appended one of it is staff to the environmental department of UIA to ease coordination between the two agencies.

3.3.3 Water Act, Cap 152

The objective of this Act is to enable equitable and sustainable management, use, protection and management of water resources 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 Development (DWD). Construction is herein defined to include alteration, improvement, maintenance and repair of water systems. The Act also aims to control pollution of water resources (Sections 28 and 31). The Fourth Schedule of the Water (Waste Discharge) Regulations, 1998 based on this Act outline discharge fees and the process of obtaining wastewater discharge permits.

Relevance to the Scheme: This Act applies to protection of Namanve River that drains through the industrial park discharging into swaths of wetlands in the southern portions of the KIBP.

3.3.4 Land Act, Cap 227

The Land Act provides for tenure, ownership and management of land. Land is to be used in compliance with relevant national laws such as listed in Section 43 including the Water Act and National Environment Act. Section 70 (1) states that subject to Section 44 of this Act, all water rights in any natural watercourse

shall be reserved to the Government and no such water shall be obstructed, dammed, diverted, polluted or otherwise interfered with except in pursuance of permission in writing granted by the Minister responsible for water or natural resources in accordance with the Water Act. According to Section 44(5), Government may grant concessions, licences or permits for using any such land in a manner stipulated by relevant laws and in conformity to the Town and Country Planning Act.

Relevance to the Scheme: An area comprising the KIBP was degazetted from Namanve Forest Reserve and designated as an industrial park under the custodianship of UIA and as such, governed under the Land Act.

3.3.5 The Road Act, Cap 358

The Road Act Cap 358 o provides for establishment of road reserves and for the maintenance of roads. The need for Government to maintain basic control over developments along the road is to ensure that basic necessities of maintaining road geometry and engineering needs such as sight lines, horizontal curvatures, sight distances and road safety considerations are met. Also, it is in road reserves that utilities infrastructure (electricity transmission lines and water mains) is commonly installed.

Relevance to the Scheme: Two key existing roads are currently associated with development of the industrial park, namely: new Jinja-Kampala Highway and Old Jinja Road. The proposed Kampala-Jinja Expressway is another major road that will traverse through the southern section of the KIBP. The Road Act applies to these roads associated with KIBP.

3.3.6 Local Governments Act, Cap 243

Sections 17, 22 and 30 of this Act provide for decentralized governance and devolution of central government functions, powers and services to local governments and committees that have own political and administrative set-ups. Districts have powers to oversee implementation of development activities. Section 64 of the Act gives functions of the Chief Administrative Officer as the head of the public service in the District and the head of the administration of the District council and as the accounting officer.

The proposed Scheme would be under the administrative jurisdiction of Mukono and Wakiso Districts in Municipal Council of Mukono and Kira. According to Section 9 of the Act, a local government is the highest political and administrative authority in its area of jurisdiction and shall exercise both legislative and executive powers in accordance with the Constitution.

Relevance to the Scheme: This Act is relevant since local governments of Mukono and Wakiso Districts will both be stakeholders in the development and operation of the KIBP.

3.3.7 Public Health Act, Cap 281

This Act aims to avoid pollution of environmental resources that support health and livelihoods of communities. Article 5 of the Act authorises local council to take lawful, necessary and reasonably practicable measures for preventing the occurrence of, or for dealing with any outbreak or prevalence of, any infectious, communicable or preventable disease; to safeguard and promote the public health; and to exercise the powers and perform the duties in respect of the public health conferred or imposed by this Act or by any other law.

Relevance to the Scheme: This Act is relevant to the extent that solid waste, wastewater and air emissions from the industrial park should not affect public health and amenity of surrounding communities.

3.3.8 Investment Code Act, Cap 92

Section 18(2) (d) of the Act requires an investor to take necessary steps to ensure that development and operation of an investment project do not cause adverse ecological and socio-economic impacts.

Relevance to the Scheme: This Act bestows responsibility onto a developer to avoid or effectively manage environmental pollution originating from their investment.

3.3.9 The National Environment (Wetlands, River Banks, and Lakeshores management) Regulations, 2000

The objective of these regulations is to: provide for the conservation and wise use of wetlands and their resources in Uganda, give effect to clause 2 of article 237 of the constitution of Uganda, ensure water catchment conservation and flood control, ensure the sustainable use of wetlands for ecological and tourist purposes for the common good of all citizens, ensure that wetlands are protected as habitats for species of Fauna and Flora, provide for the regulated public use and enjoyment of wetlands, enhance research and its related activities, minimise and control pollution.

Section 29, Part (2), of the Regulation states that 'Rivers not specified in the Sixth Schedule shall have a protected zone of thirty metres from the highest water mark of the river'. Section 30, Part (1) states that 'All shores of lakes specified in the Seventh Schedule [Lake Victoria is in the 7th Schedule] to these Regulations shall have a protected zone of two hundred metres measured from the low water mark'.

Relevance to the Scheme: Relevance of these regulations to the ESIA study is embedded in the following:

- Wetland resources on should be managed or utilised in a sustainable manner. Part of the southern portion of the industrial park has swaths of wetland.
- Measures such as preventing soil erosion, siltation and water pollution, should be put in place for protection of wetlands connected to the KIBP.

3.3.10 The National Environment (Noise Standards and Control) Regulations, 2003.

The purpose of these regulations is to ensure the maintenance of a healthy environment for all people in Uganda, the tranquility of their surroundings and their psychological well-being by regulating noise levels, and generally, to elevate the standard of living of the people by:

- Prescribing maximum noise levels from a facility or activity to which a person may be exposed.
- Providing for control of noise and for mitigating measures for the reduction of noise.

Relevance to the Scheme: In the context of the Scheme, the noise regulations provide guidance for construction and operations phases as follows:

- The maximum noise levels from a facility in the general environment specified in Column 1 of Part I of the First Schedule to which a person may be exposed shall not exceed the level specified in Column 2 of that Part for the time specified that Part.
- The maximum noise levels of continuous or intermittent noise from a factory or a workshop, to which person may be exposed shall not exceed the level specified in Column 1 of Part II of the First Schedule, for the time specified in Columns 2 and 3 of that Part.
- The maximum noise level from impact or impulsive noise to which a person may be exposed shall be as specified in column 1 of Part III of the First Schedule for the permitted number of impulses or impacts emitted per day specified in Column 2 of that Part.
- The maximum noise level from a construction site to which a person in a facility specified in Column 1 of Part IV of the First Schedule may be exposed.

Table 3.1: Maximum Permissible Noise Levels (Continuous or intermittent noise) from a Factory or Workshop

Leq dB (A)	Duration (Daily)	Duration (Weekly)
85	8 hours	40 hours
88	4 hours	20 hours
91	2 hours	10 hours
94	1 hour	5 hours
97	30 minutes	2.5 hours
100	15 minutes	1.25 hours
103	7.5 minutes	37.5 minutes
106	3.75 minutes	18.75 minutes
109	1.875 minutes	9.375 minutes

Source: Ugandan National Environment (Noise Standards and Control) Regulations, 2003

According these regulations, noise levels shall not exceed an Leq of -

- Factory/Workshops 85 dB (A)
- Offices 50 dB (A)
- Factory/Workshop Compound 75 dB (A).

Table 3.2: Maximum Permissible Noise Levels for Construction Site

	Day	Night
Noise Control Zone:	**Sound Level dB (A) (Leq)**	**Sound Level dB (A) (Leq)**
Residential	60	40
Commercial	75	50
Industrial	85	65

Daytime is defined as: 06:00 am - 22.00 pm Night is defined as: 22.00 pm - 06.00 am
Source: Ugandan National Environment (Noise Standards and Control) Regulations, 2003

The Act also allows a person or entity expecting to generate noise in excess of regulatory limits to apply to the NEMA for a license to emit noise in excess of the permissible levels.

3.3.11 National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations, 1999

Section 6 (2) details maximum permissible limits for 54 regulated contaminants which must not be exceeded before effluent is discharged into water or on land.

Relevance to the Scheme: For this scheme, this standard is appliance to disposal of industrial wastewater from the KIBP.

Table 3.3: National discharge standards for selected pollutants

Parameter	National discharge standards
BOD5 (mg/l)	50
Suspended solids (mg/l)	100
Faucal coliforms	10,000 counts/ 100ml
Chlorine residual (mg/l)	1 mg/l
pH	6-8
Phenols (µg/l)	0.2 mg/l
Oil and grease (mg/l)	10 mg/l
Total Phosphorus (mg/l)	10 mg/l
Temperature	20-35°C

Source: Ugandan National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations, 1999

3.3.12 National Environment (Waste Management) Regulations, 1999

These regulations require waste disposal in a way that would not contaminate water, soil, and air or impact public health. The regulations aim to prevent and regulate discharge of waste to air, water and land require establishing a system of waste planning and management.

Relevance to the Scheme: The industrial park shall have waste treatment facilities within the park however if any waste is to be transported out of the park, according to the regulations, waste haulage and disposal should be done by entities licensed by NEMA.

3.3.13 Draft National Air Quality Standards, 2006

The draft national air quality standards provide the following regulatory limits (see Table 3.4), which shall apply for the KIBP.

Table 3.4: Uganda's regulatory air quality standards for selected pollutants

Pollutant	Averaging time for ambient air	Standard for ambient air
Carbon dioxide (CO2)	8 hr	9.0 ppm
Carbon monoxide (CO)	8 hr	9.0 ppm
Hydrocarbons	24 hr	5 mg m-3
Nitrogen oxides (NOx)	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 (SO2)	24 hr	0.15 ppm
Sulphur trioxide (SO3)	24 hr	200 µg Nm-3

Note: ppm = parts per million; "N" in µg/Nm-3 connotes normal atmospheric conditions of pressure and temperature (25°C and 1 atmosphere).
Source: Ugandan draft National Air Quality Standards, 2006

Relevance to the Scheme: Air emissions from individual industrial facilities within the park should conform to the above regulatory limits through emissions scrubbing and monitoring.

3.3.14 Traffic and Road Safety Act, Cap 361, 1998

The Act provides for use of motor vehicles, control of traffic, enforcement of safe use of public roads.

Relevance to Scheme: This Act is relevant on account of the size of construction traffic currently plying roads within KIBP and that expected as construction activities intensify. Heavy traffic is also expected during operation phase of the industrial park. It is essential that both construction and operation phases traffic pose no impact on safety of road users.

3.3.15 The Forests Act, Cap 246

A part of Namanve Central Forest Reserve (NCFR) currently occupied by Kampala Industrial and Business Park (or "Namanve Industrial Park") was degazetted by *The Forest Reserves (Namanve Central Forest Reserve) (Partial Revocation) Order, 1996* (also referred to as Statutory Instrument Supplement No.1 1997). Section 2 of this statutory order stated that area set out in the order (10006 hectares at the time of this Order) which formed part of NCFR as declared by the Forest Reserve (Declaration) Order, 1968 shall with immediate effect cease to be a forest reserve.

Relevance to the Scheme: The partial revocation order presents two aspects related to the Scheme site, namely:

- Area occupied by KIBP is no longer a forest reserve and currently devoid of trees.
- Following degazetting, any occupant or users (other than industries) of land in KIBP is not a legitimate owner of the land occupied or used.

3.3.16 Employment Act, 2006

Employment Act, 2006 repeals Employment Act (Cap 219) enacted in 2000. This Act is the principal legislation that seeks to harmonize relationships between employees and employers, protect workers interests and welfare and safeguard their occupational health and safety through:

- Prohibiting forced labour, discrimination and sexual harassment at workplaces (Part II; Part IV).
- Providing for labour inspection by the relevant ministry (Part III).
- Stipulating rights and duties in employment (weekly rest, working hours, annual leave, maternity and paternity leaves, sick pay, etc. (Part VI).
- Continuity of employment (continuous service, seasonal employment, etc (Part VIII).

Relevance to the Scheme: Both during construction and operation of the KIBP, this Act will guide workplace relations between employees and employers.

3.3.17 Occupational Safety and Health Act (2006)

The Act replaces the Factories Act (1964). It departs from the original listing of "don'ts" and adopts a scientific approach in which technical measures required for protection of workers are prescribed, hence taking on a "preventive approach".

The Act provides for prevention and protection of persons at all workplaces from injuries, diseases, death and damage to property. It covers not just the "factory" (as did the Factories Act) but also any workplace where persons are employed and its provisions extend not just to employees but to any other persons that may be legitimately present in a workplace and are at risk of injury or disease. Employers must protect workers from adverse weather and provide clean and healthy work environment, sanitary conveniences, sanitary and protective gear.

Relevance to the Scheme: The Act is relevant in relation to protection of health workers against occupational injuries both during construction and operation phases.

3.4 International Standards and Guidelines

3.4.1 International Finance Corporation Performance Standards on Environmental and Social Sustainability

The International Finance Corporation (IFC) Performance Standards are an international benchmark for identifying and managing environmental and social risk and has been adopted by many organisations as a key component of their environmental and social risk management. The IFC adopts eight Performance Standards that provide guidance in the identification and associate measures to avoid, minimize and manage socio-environmental risks and impacts.

The table below presents a brief description of IFC PS, and their relevance for the project under evaluation.

Table 3.5: Applicability of the IFC PSs (2012)

IFC Performance Standards	Description	Applicable to the project?
PS1: Assessment and Management of Environmental and Social Risks and Impacts	Requires assessment of negative and positive environmental and social impacts at an early stage of project development and the adoption of a systematic approach to monitor and manage impacts on an on-going basis. Risks and impacts need to be identified in the context of the project's area of influence, which includes the area to be affected by the project's direct and indirect impacts, associated facilities as well as cumulative impacts. Requirements from PS1 include the early analysis and engagement of project stakeholder (including engagement adequate engagement and directives for interaction with indigenous communities), external communication and grievances mechanisms to receive and facilitate resolution of Affected Communities' concerns and grievances about the client's environmental and social performance.	Yes
PS2: Labour and Working Conditions	Requires that the pursuit of economic growth through employment creation and income generation must be accompanied by protection of the fundamental rights of workers. It is designed to maintain sound worker-management relationships and promote fair treatment, non-discrimination and equal opportunities for workers.	Yes
PS3: Resource Efficiency and Pollution Prevention	Requires a project-level approach to pollution prevention and control as well as resource efficiency in line with European and international legislation and practices.	Yes
PS4: Community Health, Safety, and Security	Addresses the responsibility to avoid or minimise the risks and impacts to community health, safety and security of the local community that may arise from project–related activities, with particular attention to vulnerable groups.	Yes
PS5: Land Acquisition and Involuntary Resettlement	Involuntary resettlement refers both to physical displacement and to economic displacement as a result of project-related land acquisition and/or restrictions on land use. Resettlement is considered involuntary when affected persons or communities do not have the right to refuse land acquisition or restrictions on land use that result in physical or economic displacement	Yes
PS6: Biodiversity Conservation and	Requires that projects avoid or mitigate threats to biodiversity arising from their operations, as well as manage renewable natural resources in a	Yes

IFC Performance Standards	Description	Applicable to the project?
Sustainable Management of Living Natural Resources	sustainable manner. Where critical or natural habitats are affected, projects must achieve 'net gain' or 'no net loss' in biodiversity respectively.	
PS7: Indigenous Peoples	Requirement to safeguard the rights of indigenous peoples, identified as social groups with identities that are distinct from mainstream groups in national societies, and who are often among the most marginalised and vulnerable segments of the population.	No
PS8: Cultural Heritage	Aims to ensure that developers protect cultural heritage in the course of project activities and to support the conservation of cultural heritage.	Yes

Source: Mott MacDonald, 2019, based on IFC PS 2012.

Additionally, IFC's Guidelines on Environment, Health and Safety (EHS Guidelines) are technical reference documents that bring general and specific examples of good international industry practice (GIIP) to meet IFC's Performance Standards. Industry sector EHS guidelines are designed to be used together with the General EHS Guidelines document, which provides guidance to users on common EHS issues potentially applicable to all industry sectors.

Table 3.6 shows gaps analysis between IFC PS's and Uganda Environmental Legislation and how the gaps are to be complied with in this Scheme.

Table 3.6: Gap analysis between IFC standards and Ugandan environmental regulations

	Performance standard	Ugandan EIA regulation	Application to KIBP scheme and gaps identified	Where gap(s) are addressed in ESIA
Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts				
1	An Environmental and Social Management System (ESMS) should be developed to describe mitigation or performance improvement measures proportionate with the level of social and environmental risks and impacts identified by the ESIA.	Ugandan environ law requires an ESMP in an EIA report but it doesn't require mitigation and performance improvement measures to be translated into an Environmental and Social Management System as part of the ESIA.	The Scheme covers a large spatial extent, consists of large and diverse industrial/ commercial facilities and it will be appropriate for such a large scheme to have an ESMS.	A recommendation is made (in the ESIA) for UIA Environment Team to develop a KIBP-wide ESMS based on this ESIA and IFC's ESMS guidelines (ESMS Implementation Handbook - General. Version 2.1 November 2015)
2	The development of a SEP is recognised as a tool in such a management system.	National Environmental Act (NEA 2019) requires adequate public participation during the ESIA process for interested and affected parties to provide their opinions about a project.	Although the Ugandan environmental law requires adequate public participation, it does not specifically require development of a SEP.	• A SEP is included in Volume IV of this ESIA. • This ESIA report provides the relevant stakeholder engagement that has taken place during its preparation.
3	The risks and impact identification process will be based on recent environmental and social baseline.	The Ugandan EIA law also requires assessment to be based on prevailing baseline conditions.	Ugandan law provides for this.	The ESIA update has utilised current baseline conditions.
4	Emergency preparedness and response should be developed when the project involves specifically identified elements that are likely to generate impacts.	Not required by Ugandan EIA law.	Although this is not required by Ugandan law it is applicable to this scheme.	Considering the diversity of industries to occupy KIBP (some not yet known at this point), a recommendation is made in the ESIA for each tenant of the industrial park to develop and implement own site-specific Emergency Preparedness and Response Plan.
Performance Standard 2: Labour and Working Conditions				
1	Recognises that the pursuit of economic growth through employment creation and income generation should be balanced with the protection of basic rights for workers.	Corresponding requirements are contained in the following Uganda laws: Employment Act (2006), Uganda's Constitution (1995) and OHS Act (2006)	Yes this is applicable and the Ugandan laws make adequate provision for this requirement.	This is provided for in the ESMP of this ESIA.
2	Occupational health and safety requires minimisation of causes of hazards in a manner consistent with GIIP.	Uganda's OHS Act (2006) requires that every employer must, without charge to the employees, provide a working environment that is safe and poses no occupational risk to health of employees; and has adequate provision for welfare of workers.	Yes this is applicable and the Ugandan law make adequate provision for it. The Ugandan EIA law, however, does not refer to use of the international standards/ Guidelines but this has been done for this ESIA.	The ESIA has been prepared based on both Ugandan and international (IFC) standards. The ESMP provides specific OHS impacts, their mitigation and monitoring.
Performance Standard 3: Resource Efficiency and Pollution Prevention				
1	Implement measures for improving resources and material consumption minimisation.	Not specifically required by Ugandan law except to the extent it requires minimisation of waste generation and environmental pollution.	Although this is not required by Ugandan law it has been considered in this ESIA.	ESMP

	Performance standard	Ugandan EIA regulation	Application to KIBP scheme and gaps identified	Where gap(s) are addressed in ESIA
2	Consider alternatives to reduce project Greenhouse Gas (GHG) emissions during design and operation.	Uganda's The Climate Change Bill 2018 makes this requirement.	Ugandan law and regulations make adequate provision for this requirement.	Air Quality Assessment and ESMP
3	Avoid, or where not possible minimise release of pollutants and generation of hazardous and non-hazardous waste materials.	The National Environment (Waste Management) Regulations, 1999 aim to regulate discharge of pollutants to air, water and land and require establishing a system of waste planning and management.	Ugandan law and regulations make adequate provision for this requirement.	ESMP
Performance Standard 4: Community Health, Safety, and Security				
1	Recognises that project activities and infrastructure bring benefits to communities including employment, services and opportunities for economic development. However, the project can also increase potential for community exposure to risks.	These considerations are provided for in Uganda's: Employment Act (2006), Uganda's Constitution (1995) and OHS Act (2006)	Yes this is applicable and the Ugandan law makes adequate provision for it.	Social impact analysis section in ESIA and ESMP.
2	Where project activities pose risks of adverse impacts on the community health and safety, the developer is required to make available relevant information to affected parties and government authorities so that they can fully understand the nature and extent of possible risks. This includes the details of an Emergency Preparedness and Response Action Plan.	Uganda's EIA Guidelines require that project proponents provide information containing all relevant facts in respect of the project to all relevant stakeholders throughout the ESIA process.	Yes this is applicable and the Uganda environmental guidelines make provision for this requirement. However, an Emergency Preparedness and Response Action Plan is not a requirement.	A recommendation is made in the ESIA that each industry in KIBP develops own in-house Emergency Preparedness and Response Action Plan.
Performance Standard 5: Land Acquisition and Involuntary Resettlement				
1	Consultation needs to take place with host and affected communities during involuntary resettlement.	Uganda's EIA regulations do not have provisions for resettlement. The country has no specific national resettlement guidelines other than The Land Act Cap 227 stating that land belongs to the people and that due equitable compensation should be given to anybody losing land to a private or public project.	Land comprised in KIBP industrial park is wholly owned by UIA and compensation is not applicable.	People temporarily using sections of the KIBP will lose livelihoods once land parcels they use (for brick making, sand mining and cultivation) are developed by the legitimate industrial owners. This aspect has been covered in the LRP developed as part of this study.
Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources				

	Performance standard	Ugandan EIA regulation	Application to KIBP scheme and gaps identified	Where gap(s) are addressed in ESIA
1	Recognises that protecting and conserving biodiversity in all its forms is fundamental to sustainable development.	Article 245 states that Parliament shall, by law, provide for measures intended: (a) to protect and preserve the environment from abuse, pollution and degradation; (b) to manage the environment for sustainable development; and (c) to promote environmental awareness. Similar requirements are made in various sections of the National Environment Act 2019.	Yes this is applicable and the Uganda law make provision for most of this requirement.	ESIA baseline chapter, Impact Assessment Chapter and ESMP.
Performance Standard 7: Indigenous People				
1	Recognises that indigenous groups in a project area can be at particular risks which may include loss of identity, culture, traditional lands and natural resource-based livelihoods.	Third Schedule of Uganda's Constitution 1995 provides to protection of indigenous people.	This PS does not apply since no indigenous people use KIBP land or are located within the vicinity of the scheme area.	Not applicable.
Performance Standard 8: Cultural Heritage				
1	Recognises the importance of cultural heritage for current and future generations. Aims to protect irreplaceable cultural heritage and to guide clients on protecting cultural heritage in the course of their business operations.	Article XXV requires preservation of public property and heritage stating that State and citizens shall endeavour to preserve and protect Uganda's heritage.	Yes, this is applicable, and the Ugandan law make provision for most of this requirement.	ESIA baseline chapter, Impact Assessment Chapter and ESMP.

3.4.2 International Conventions

Uganda is a signatory to international treaties listed below. Although it is expected that they will be only remotely related to the Scheme, the contractor (during construction) and all various industries who will be tenants in the KIBP should be aware of their existence and implication (where applicable) to their operations.

- African Convention on the Conservation of Nature (1968).
- International Convention Concerning the Protection of World and Cultural Heritage 1972.
- Protocol Agreement on Conservation of Common Natural Resources (1982).
- Stockholm Convention on persistent organic pollutants (POPS).
- Strategic approach to international chemicals management (SAICM).
- The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).
- UN Framework Convention on Climate Change (UNFCCC) and related Kyoto Protocol.

3.5 Institutional Framework

3.5.1 National Environmental Management Authority (NEMA)

The National Environmental Act provides for the establishment of NEMA as the principal agency responsible for coordination, monitoring and supervision of environmental conservation activities. NEMA is under the Ministry of Water and Environment (MoWE) but has a cross-sectoral mandate to oversee the conduct of ESIA through issuance of ESIA guidelines, regulations and registration of practitioners. It reviews and approves environmental impact statements (EIS) in consultation with any relevant lead agencies which for the case of this scheme will include the Ministry of Works & Transport, Wetlands Inspection Division, National Forestry Authority, and Directorate of Water Development.

NEMA works with District Environment Officers and local environment committees at local government levels who also undertake inspection, monitoring and enforce compliance on its behalf. In Government ministries, NEMA works with Environmental Liaison Units to ensure that they effectively incorporate environmental issues in their activities, policies and programs.

Role: NEMA will be responsible for review of the ESIA, and review of the subsequent monitoring.

3.5.2 Ministry of Water and Environment (MWE)

The Ministry of Water and Environment (MWE) is mandated to promote and ensure the rational and sustainable utilization and development and safeguard of land and water resources and environment, for social and economic welfare and development as well as for regional and international peace; In addition, the Ministry promotes the utilisation of weather and climatic information for sustainable development.

Role: MWE regulates water abstraction, water use and effluent discharge by issuing water abstraction permits, wastewater discharge permits and permit to construct in/ across watercourses. All these activities are expected to happen during construction or operation of KIBP and MWE is therefore a key institutional stakeholder.

3.5.3 Wetlands Management Department (WMD)

Wetlands in Uganda represent one of the most vital economic resources the country has, the services and products provided by wetlands contribute millions of US Dollars per year to the Ugandan economy. Traditionally seasonal wetlands and margins of permanent wetlands have been used for grazing cattle, growing crops and as a source for domestic water. In addition, they are a major habitat for wildlife

resources. The Wetlands Management Department under the Ministry of Water and Environment was established to develop policies and implementation strategies for the sustainable management of Uganda's wetlands that promote sustainable wetland management in Uganda.

Role: WMD is the custodian of all gazetted wetlands in Uganda. Small portions of southern sections of KIBP have wetlands that will need protection and monitoring both during construction and operation of the Scheme.

3.5.4 Ministry of Works and Transport (MoWT) and Uganda National Roads Authority (UNRA)

This Ministry makes policies and plans for the transport sector entailing roads water transport and rail. Besides existing railway sidings, a standard gauge railway and station will be constructed in the southern section of KIBP. A flyover will also be constructed across Jinja Highway to connect the northern and southern sections of KIBP. The proposed Kampala-Jinja Expressway will traverse a portion of the southern section of KIBP.

Role: At a ministerial level, Planting and overseeing implementation of aforementioned projects is a preserve of MoWT.

3.5.5 The Ministry of Local Government (MoLG)

The MoLG oversees the implementation of Local Government Development Plans, which include water supply and programmes for the improvement of hygiene and sanitation in institutions and public places.

3.5.6 Ministry of Gender, Labour and Social Development

This ministry is responsible for overseeing gender equity, workplace conditions, labour capacity and quality in Uganda. The ministry is mandated to:

- Create an enabling environment for increasing employment opportunities and productivity for improved livelihoods and social security for all, especially the poor and vulnerable;
- Ensure that issues of inequality and exclusion in access to services across all sectors and at all levels are addressed; and
- Protect vulnerable persons from deprivation and livelihood risks.

Role: The OHS Department in the ministry is responsible for registering each workplace and issuing it a permit after inspection for occupational safety. It is also authorised to carry out scheduled and impromptu inspections of any workplace to establish quality of working conditions

3.5.7 District Local Governments

The KIBP lies within jurisdictions of Wakiso and Mukono Districts. A district is headed by a Chairman Local Council Five (LC5) who is the political head and Chief Administration Officer, the technical head of district administration. Technical District personnel directly involved with the Scheme include Environmental Officer, District Planner, Community Development Officer, District Director of Health Services, Wetlands Officer, Forestry Sector Manager, Agricultural Officer, District Water Officer and District Engineer.

Equally important are village-level local council administration (LC I and LC II) who are closer to residents and effective in community mobilisation, sensitisation and dispute resolution.

Role: Technical officers in the two district local governments (e.g. District Environment Officers) will be responsible for inspection and monitoring within the industrial park both during its construction and operation.

4. ESIA Scope and Methodology

4.1 Introduction

This chapter presents the ESIA scope and methodology that have been employed to form the basis of the assessments that are presented in this ESIA.

4.2 Previous ESIAs for the KIBP

Two previous ESIAs have been produced for the KIBP. An ESIA was produced in 2002 (the "2002 ESIA"), with a subsequent ESIA produced in 2008 (the "2008 ESIA") to reflect the updated masterplan. Both of these previous ESIAs received approval from NEMA. These ESIAs have been reviewed to form the basis of further assessments proposed for the purposes of the Scheme.

This ESIA builds upon the results of the approved 2008 ESIA now that further design information is available, taking into account the development of baseline conditions in the site, and aims to provide an even greater level of detail. Assessment of specific operations to inhabit the KIBP is not undertaken for the purposes of this ESIA, given that each industrial operation will be required to undertake its own ESIA prior to construction for approval by NEMA.

4.2.1 2002 ESIA

The 2002 ESIA was undertaken by GIBB: Eastern Africa Ltd, assessing a previous version of the design for the Scheme. This ESIA highlighted further environmental work that needed to be undertaken. The ESIA was submitted to NEMA and approved. However, further design development further development and implementation of that scheme, and instead a new ESIA was undertaken in 2008.

4.2.2 2008 ESIA

The 2008 ESIA was undertaken by EMA Ltd and built upon the 2002 ESIA, filling in gaps highlighted above and to cover further surveys required in the subsequent elapsed time since previous studies on socio-economics and biodiversity, with all assessments taking into account the modified masterplan since the 2002 ESIA. The 2008 ESIA highlighted gaps in the 2002 ESIA concerning the proposed earthworks for the Scheme. The 2008 ESIA also highlighted gaps in the air quality and noise baseline.

Given the elapsed time period (and therefore potential for baseline changes to have occurred), as well as changes in design, the 2008 ESIA requires updating to give a better reflection of the environmental and social impacts associated with the Scheme. This ESIA therefore represents this update, whilst focussing particularly on the infrastructure elements which will facilitate the KBIP's development.

4.3 ESIA Screening

ESIA Screening has not taken place as it is considered that the basis for ESIA still stands, given it is an update to the 2008 ESIA. Therefore, it has been proposed that the requirement for ESIA remains, and that the ESIA process commenced with the Scoping stage.

4.4 ESIA Scoping

4.4.1 Technical Scope

A report comprising a request for a Scoping Opinion was submitted to NEMA in April 2019, as shown in Appendix 4.1. This document reviewed the known baseline against the Scheme and made a conclusion

on the potential significant effects that could be realised for a range of topics during both the construction and operational phases. This formed the basis of the proposed scope of the ESIA for the Scheme. Furthermore, the Scoping Report also included the proposed methodology that would be followed.

A Scoping Opinion from NEMA was provided on 31st May 2019, as shown in Appendix 4.2. This Scoping Opinion confirmed the scope that was proposed in the Scoping Report, noting that the ESIA only considers the infrastructure to support the KIBP, and not the individual plot developments.

In addition, it was proposed in the Scoping Opinion, and agreed subsequently with NEMA, that the wastewater treatment and solid waste management facilities would be considered by a future ESIA separate to this one (see also Section 2.4.4). This would enable further design details on those Scheme aspects to be further developed. Therefore, consideration of wastewater and solid waste management in this ESIA is limited to high-level consideration of construction traffic impacts and cumulative effects.

The confirmed scope from the Scoping Opinion is as follows:

Table 4.1 Agreed Scope of the ESIA

Impact / aspect	Construction	Operation
Water Resources	Scope In	Scope In
Geology and Soils	Scope In	Scope In
Biodiversity and Conservation	Scope In	Scope In
Air Quality	Scope In	Scope In
Greenhouse Gas (GHG) Emissions	Scope In*	Scope In*
Noise and Vibration	Scope In	Scope In
Waste Management	Scope In	Scope In
Landscape and Visual Characteristics	Scope In	Scope In
Socio-Economics and Community	Scope In	Scope In
Cultural Heritage and Archaeology	Scope In	Scope Out
Traffic and Transport	Scope In	Scope In
Cumulative Impacts	Scope In	Scope In

* Note GHG Emissions will follow a separate methodology and will act as a separate assessment within the ESIA report.

The agreed methodology for the ESIA is as-presented in the sections below.

4.4.2 Assessment Scope

In accordance with national and international requirements, the ESIA will consider the following:

- Environmental, social, labour, health, safety and security risks and impacts of the Scheme;
- Scheme components and related aspects that are not directly part of the Scheme, but which would not have been constructed or expanded without the Scheme and are needed for the Scheme to be viable (such as borrow pit locations located off-site). This includes reviewing potential cumulative impacts and unplanned but predictable developments caused by the Scheme that may occur later or at a different location;
- Potential impacts and resulting effects that may arise for each key stage of the Scheme that can be reasonably assessed at this stage, including pre-construction, construction and operation;
- Potential third-party impacts including supply chain considerations; and
- Identification of beneficial and adverse, direct and indirect as well as cumulative impacts and effects of the Scheme related to the bio-physical and the socio-economic environment.

Cumulative effects are considered, examining the combination of multiple impacts upon a receptor as a result of multiple effects resulting from the Scheme together with other nearby developments (see Chapter 16).

As with the technical assessments, significant effects and appropriate mitigation are identified as part of the assessment of cumulative effects, building upon the effects identified in the technical chapters.

Due to the length of the Scheme lifetime, the impacts of decommissioning at the end of Scheme life cannot be properly predicted at this stage. The decommissioning phase of the Scheme is likely to be over 100 years away. As such, it is difficult to produce an accurate and meaningful prediction of the significance of likely impacts and their effects because the baseline conditions are likely to have changed notably by this phase of the Scheme. The ESIA therefore does not assess the likely impacts that may arise from the decommissioning phase. A decommissioning plan must be developed five years prior to decommissioning, including a full impact assessment and mitigation plan.

Should any decommissioning or refurbishment occur, consultation with NEMA will be undertaken prior to these activities to appropriately assess likely E&S impacts based on an adapted baseline, to understand if assessments, including ESIA, are required, and to ensure the works conform with necessary local requirements. Assessments would mitigate or enhance these impacts based on mitigation/enhancement measures available and feasible at that time. This action is included in the ESMP (see Chapter 19) and as such implements an adaptive environmental management approach with regards to associated likely impacts and their management during the decommissioning phase.

The ESIA is based on the general assumption that baseline conditions are unlikely to change significantly between the commencement of construction and its completion.

4.5 Impact Assessment Process

The impact assessment methodology followed, and as confirmed by the Scoping Opinion (Appendix 4.2), is in line with national and international requirements.

In Uganda, the Environmental Impact Assessment process is a legal requirement under the National Environment Act 2019 (see Section 3.3.2). This requires screening and scoping of the Scheme to identify potential impacts and determine the scope of the ESIA.

The key steps during the main ESIA phase are to: identify the study area, or area of influence; characterise the existing baseline; determine the impacts that may occur as a result of the construction and operation of the Scheme; identify how these impacts may affect the baseline conditions; evaluate the significance of the likely effects; and identify mitigation and enhancement measures to reduce any adverse effects and maximise any benefits resulting from the Scheme. The approach to these stages of the ESIA process is discussed below.

4.6 ESIA Study Area

4.6.1 Scheme affected area

The Project affected area (PAA) is defined as the area of land used by the Scheme permanently or temporarily. Land take of permanent structures is 896 hectares with no additional land take proposed for temporary structures, subject to confirmation through detailed design. The PAA includes the works proposed within the four Sectors.

4.6.2 Area of influence

The Area of Influence (AoI) covers all land or water, directly or indirectly impacted by the Scheme, and therefore extends beyond the KIBP boundary. This includes communities and areas adjacent to the PAA

that may experience impacts during the construction or operation of the Scheme, despite being located outside of the area in which the Scheme will be located e.g. visual or noise impacts. The AoI is defined on a topic by topic basis, as each topic will define its AoI based upon the potential effects.

4.7 Baseline Conditions Consideration

Baseline information has been collated from a range of sources including primary data collection, secondary data collection, publicly available information and through consultation, in order to update the baseline conditions described in the ESIA 2008.

Primary data was collected through:

- Site visits – March to May 2019 (specific surveys are detailed in the relevant topic sections);
- Biodiversity baseline surveys;
- Geotechnical and soil sampling;
- Cultural heritage baseline surveys;
- Water sampling;
- Traffic counts;
- Targeted stakeholder meetings;
- Air quality monitoring surveys;
- Noise surveys; and
- KIBP Waste Survey (Omara T., et al, 2019).

In addition, baseline data was collected from desktop studies of available secondary data including websites and articles and reports from local authorities, ministries, government organisations, civil society organisations, non-governmental organisations (NGOs), local media, and business groups. Relevant secondary sources used to support the assessment process are referenced in the relevant impact assessment sections.

A range of people and organisations were consulted during the ESIA process. Stakeholder activities and comments are summarised in Section 17.4, along with the results of the public consultation.

4.8 Assessment Methodology

For each topic, the assessment identifies the magnitude of the predicted impacts resulting from construction and operation of the Scheme and the resulting level of effect against identified sensitive receptors. These impacts and effects occur a result of an interaction between Scheme works and the identified baseline. To determine the level of effect, the likely magnitude of the impact and the sensitivity of the receptor are defined. The specific criteria for determining significance are taken from this, but are specific to each topic, and are described in more detail in each technical chapter.

This section provides further detail to the generic criteria followed for definition of magnitude and sensitivity.

Where the approach for the assessment undertaken for an aspect deviates from this generic methodology (i.e. GHG emissions) the methodology followed for that particular topic is included in the relevant impact assessment section.

4.8.1 Magnitude Criteria

The assessment of impact magnitude is undertaken in two steps. Firstly, the identified impacts are categorised as beneficial or adverse. Secondly, impacts are categorised as major, moderate, minor or negligible based on consideration of parameters such as:

- Duration of the impact – ranging from 'beyond decommissioning' to 'temporary with no detectable impact'
- Spatial extent of the impact – for instance, within the site boundary, within district, regionally, nationally and internationally
- Reversibility – ranging from 'permanent requiring significant intervention to return to baseline' to 'no change'
- Likelihood – ranging from 'occurring regularly under typical conditions' to 'unlikely to occur'
- Compliance with legal standards and established professional criteria – ranging from 'substantially exceeds national standards or international guidance' to 'meets the standards, i.e. impacts are predicted to be less than the standard would allow'

Table 4.2 presents generic criteria for determining impact magnitude (for adverse impacts only). Each detailed assessment defines impact magnitude in relation to its topic.

Table 4.2: Criteria for determining impact magnitude

Category	Description (adverse impacts)
Major	Fundamental change to the specific conditions assessed resulting in long term, irreversible or permanent change, typically widespread in nature and requiring significant intervention to return to baseline; would violate national standards or GIIP without mitigation.
Moderate	Detectable change to the specific conditions assessed resulting in non-fundamental temporary or permanent change.
Minor	Detectable but minor change to the specific conditions assessed.
Negligible	No perceptible change to the specific conditions assessed.

4.8.2 Sensitivity Criteria

Sensitivity is specific to each topic and the environmental resource or population affected, with criteria generally defined on the basis of baseline information. Generic criteria for determining sensitivity of receptors are outlined in Table 4.3. Each detailed assessment defines sensitivity in relation to its topic.

Table 4.3: Criteria for determining sensitivity of a receptor

Category	Description
High	Receptor (human, physical or biological) with little or no capacity to absorb proposed changes or minimal opportunities for mitigation.
Medium	Receptor with little capacity to absorb proposed changes or limited opportunities for mitigation.
Low	Receptor with some capacity to absorb proposed changes or moderate opportunities for mitigation.
Negligible	Receptor with good capacity to absorb proposed changes or good opportunities for mitigation.

4.8.3 Evaluation of Effects

Likely effects are evaluated taking into account the interaction between the magnitude of the impact and receptor sensitivity criteria, as presented in the evaluation matrix in Table 4.4.

Table 4.4 Evaluation matrix

Sensitivity	Magnitude						
	Adverse			Neutral	Beneficial		
	Major:	Moderate:	Minor:	Negligible:	Minor:	Moderate:	Major:
High	Major	Major	Moderate	Negligible	Moderate	Major	Major
Medium	Major	Moderate	Minor	Negligible	Minor	Moderate	Major
Low	Moderate	Minor	Negligible	Negligible	Negligible	Minor	Moderate
Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

4.8.4 Types of Effect

The following types of effect are considered within this ESIA:

- Direct effects – effects which could arise from activities which form an integral part of the Scheme;
- Indirect effects - effects which could arise from activities not explicitly forming part of the Scheme;
- Permanent effects - effects which could result from an irreversible change to the baseline environment or which persist for the near future, and occur during construction or operation stages;
- Temporary effects - effects which could persist for a limited period only and occur mainly during construction;
- Positive effects - effects which could have a beneficial influence on receptors and resources; and
- Negative effects - effects which could have an adverse influence on receptors and resources.

4.8.5 Determining Significance

The objective of this ESIA is to identify the likely significant environmental and social effects of the Scheme and to reduce their significance where possible, or to explore possible offset options. Effects that have been evaluated as being 'Moderate' or 'Major' are significant and identified as such in the specialist sections. Consequently, effects that are 'Minor' or 'Negligible' are not significant.

4.9 Mitigation and Enhancement Measures

Mitigation measures are identified through the ESIA process in order the reduce the level of adverse effect upon a receptor.

The following hierarchy of mitigation measures will be applied:

- Avoid and reduce impacts through design (embedded mitigation);
- Abate impacts at source or at receptor;
- Repair, restore or reinstate to address temporary construction effects; and
- Compensation for loss or damage.

In addition to the above, community engagement and disclosure activities have played a key role in managing the extent of impacts and effects and consideration has also been given to the identification of enhancement measures. Enhancement measures are actions and processes that:

- Create new positive impacts or benefits;
- Increase the reach or amount of positive impacts or benefits; and
- Distribute positive impacts or benefits more equitably.

Each specialist section identifies relevant mitigation and enhancement measures. All the mitigation, management and monitoring measures to address likely impacts are reported in the ESMP in Chapter 19.

4.10 Residual Effects

Residual effects are those that remain after the application of mitigation and enhancement measures. Effects considered ‘Major’ or ‘Moderate’ after application of mitigation and enhancement measures, are presented as significant residual effects. These will be identified as part of this ESIA.

4.11 Uncertainty

Any uncertainties associated with impact prediction or the sensitivity of receptors due to the absence of data or other limitations are explicitly stated. Where applicable, the ESIA makes recommendations concerning measures that should be put in place with monitoring or environmental or social management plans to deal with the uncertainty so that they may be addressed.

5. Air Quality

5.1 Introduction

5.1.1 Overview

This Chapter considers the potential air quality effects associated with the construction and operation of the infrastructure associated with the KIBP in accordance with IFC guidelines. Key potential emission sources of air pollutants which could affect the health of local receptors and / or amenity have been considered.

The proposed construction and operation of the Scheme has the potential to lead to the generation of dust from construction activities along with oxides of nitrogen (NOx) and particulate matter with an aerodynamic diameter of less than 10 microns and those less than 2.5 microns (PM_{10} and $PM_{2.5}$) from construction and operational traffic.

This assessment describes the methodology used to assess air quality, identifies the Area of Influence, its baseline conditions and the sensitive receptors within it, and presents an assessment of the potential impacts to identify where significant effects are expected to arise.

5.1.1.1 Dust

Construction activities can result in temporary impacts from dust. 'Dust' is a generic term which usually refers to particulate matter in the size range 1-75 microns[1]. The nature of the area and activities to be carried out suggests that emissions of construction dust would mainly be associated with the movement and handling of material and therefore predominantly composed of the larger fractions of this range which do not penetrate far into the respiratory system. The primary air quality issue associated with dust emissions from the construction phase is therefore loss of amenity and/or nuisance caused by, for example, soiling of buildings, vegetation and laundry and reduced visibility. Nevertheless, methods proposed to reduce dust emissions will, by definition, reduce emissions of finer particulates too.

5.1.1.2 Particulate Matter

Particulates are a complex mixture of organic and inorganic substances present in the atmosphere. Some particulates occur naturally, originating from volcanoes, dust storms, forest and grassland fires. Human activities, such as the burning of fossil fuels in vehicles, power plants and various industrial processes also generate significant amounts of particulates.

Particulates are described in terms of their size; for example, the term $PM_{2.5}$ describes particulate matter that is less than 2.5 microns in aerodynamic diameter and PM_{10} describes particulate matter that is less than 10 microns.

Increased levels of fine particles in the air are linked to health hazards such as heart disease, altered lung function and lung cancer. The size of the particle is a main determinant of where in the respiratory tract the particle will come to rest when inhaled. Larger particles are generally filtered in the nose and throat and do not cause problems, but particulate matter smaller than about 10 microns can settle in the bronchi and lungs and cause health problems.

[1] Dust can be further classified according to particle size; typical metrics include particles with a mean aerodynamic diameter of less than 10 microns (µm) – known as PM_{10} – and finer particles smaller than 2.5µm diameter, known as $PM_{2.5}$.

5.1.1.3 Oxides of Nitrogen (NO_X)

Oxides of nitrogen is a term used to describe a mixture of nitric oxide (NO) and nitrogen dioxide (NO_2), referred to collectively as NO_X. These are primarily formed from atmospheric and fuel nitrogen as a result of high temperature combustion. The main sources globally are road traffic and power generation.

During the process of combustion, atmospheric and fuel nitrogen is partially oxidised via a series of complex reactions to NO. The process is dependent on the temperature, pressure, oxygen concentration and residence time of the combustion gases in the combustion zone. Most NO_X exhausting from a combustion process is in the form of NO, which is a colourless and tasteless gas. It is readily oxidised to NO_2, a more harmful form of NO_X, by chemical reaction with ozone and other chemicals in the atmosphere. NO_2 is a yellowish-orange to reddish-brown gas with a pungent, irritating odour and is a strong oxidant. Health effects from high NO_2 concentrations include respiratory illnesses.

5.1.2 Study Area and Area of Influence

The AoI with regard to air quality is the area that could potentially be affected by emissions to air during the construction, operational and decommissioning phases.

Key potential emission sources of air pollutants which could affect the health or amenity of receptors have been considered. Research indicates that impacts from construction activities that generate dust are generally limited to within 150-200m of the activity[2]. To ensure a conservative assessment, receptors located within 500m have been considered as this is a conservative estimate based on the natural conditions of the local environment compared to best practice guidance[3]. The air quality study area is thus defined as the area within 500m of construction activities.

The operational phase effects will be experienced throughout the life of the Scheme and will be located with 200 metres of the access roads.

5.2 Methodology

5.2.1 Applicable Guidelines and Standards

5.2.1.1 National Requirements

The National Environment Bill 2017[4] replaced the National Environmental Act, Cap 53[5]. The National Environment Bill requires that “the Authority shall (National Environment Management Authority), in consultation with the relevant lead agencies:

a. Establish the criteria and procedure for the measurement of air quality;
b. Prescribe ambient air quality standards and other air quality standards
c. Prescribe emission standards for various sources; and

[2] United Kingdom Highways Agency, Design Manual for Roads and Bridge (DMRB), May 2007.

[3] Institute of Air Quality Management (IAQM), Guidance on the assessment of dust from demolition and construction, February 2014.

[4] Bills Supplement. The National Environment Bill, 2017 accessed on 3 April 2019 from https://nema.go.ug/sites/default/files/NEMA%20Bill%202017%20latest%2024%20Nov%202017.pdf

[5] The National Environmental Act, Cap 153 accessed on 3 April 2019 from https://nema.go.ug/sites/all/themes/nema/docs/national_environment_act.pdf

d. Establish criteria and issue guidelines for air pollution control and mobile, stationary sources"

"The Authority shall, in collaboration with the relevant lead agency, take measures to control air pollution by:

a. requiring the redesign of existing industrial plants or the introduction of new and appropriate technology or both;
b. requiring the reduction or elimination of existing sources of air pollution; and
c. (e) making guidelines to minimise emissions of greenhouse gases."

Currently there are no air quality standards in Uganda. There is a requirement in Part IX of the Bill for the National Environment Management to establish various environmental standards and among these are air quality standards as described below.

The draft Air Quality Standards from 2006 and 2013, set ambient standards for a variety of pollutants. Draft standards applicable to the relevant pollutants for this assessment are presented in Table 5.1**:**.

Table 5.1: Draft air quality standards (µg/m^3)

Pollutant	Averaging period	Standard
Nitrogen dioxide (NO_2)	1 hour	200
	Annual	40
Total suspended particulates (TSP)	24 hour	300

Source: 2006 and 2013 draft air quality standards

5.2.1.2 International Requirements

The IFC provide a portfolio of Standards and Guidelines that should be adhered to for any project seeking IFC finance. The IFC Performance Standard 3: Resource Efficiency and Pollution Prevention aims:

"To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities"

To achieve this, the IFC provides general guidance on Good International Industry Practice with respect to ambient air quality and emissions to air. The Scheme will need to comply with the IFC Performance Standards and the standards set out in the IFC EHS Guidelines (EHS General Guidelines, 2007).

The IFC General EHS Guidelines advise that 'relevant standards' with respect to ambient air quality are national legislated standards or, in their absence, the current World Health Organisation (WHO) Air Quality Guidelines or other internationally recognised sources.

The current WHO Guidelines are provided in the Air Quality Guidelines Global Update 2005. These guidelines are intended to support actions for air quality at the optimal achievable level for public health protection in different contexts. The WHO does not formally prescribe how guidelines should be used in air quality management. However, the Air Quality Guidelines Global Update does provide 'Interim Targets' to aid the progression of policy development to bring air quality in line with the proposed guideline values.

The General EHS Guidelines specifically refer to the European Union (EU) Directives as being an 'internationally recognised source' of ambient air quality standards. Although numerically equal to the WHO standards for some pollutants, the EU legislation introduces a threshold of

tolerance to account for exceptional, worst case episodes. This translates as a limit not to be exceeded more than a certain number of times per year and can be expressed as a 'percentile'. Table 5.2 presents the ambient air quality standards for the protection of human health based on EU Directives; as demonstrated in the table the draft national standards are numerically the same for NO_2 but do provide additional standards for particulate matter (PM_{10} and $PM_{2.5}$). On this basis, the national standards presented in Table 5.1 have been used for NO_2 and TSP and supplemented by the EU standards for PM_{10} and $PM_{2.5}$ for the assessment.

The IFC General EHS Guidelines suggest that, as a general rule, emissions should not contribute more than 25 percent of the relevant air quality standards to allow additional, future sustainable development in the same airshed. Therefore, the significance of the impact of the Scheme has been discussed in the context of this approach.

Table 5.2: Relevant EU Ambient Air Quality Standards for the Protection of Human Health (µg/m^3)

Pollutant	Averaging Period	European Union Standards	Allowance of number of occurrences above the threshold
Nitrogen dioxide (NO_2)	1 hour	200	18
	Annual	40	-
Particulate Matter (PM_{10})	24 hour	50	35
	Annual	40	-
Particulate Matter ($PM_{2.5}$)	Annual	25	-

The IFC also requires occupational health and safety to be assessed against appropriate standards. Occupational standards are not nationally available in Uganda but are available from a variety of international sources including The National Institute for Occupational Safety and Health (NIOSH) and the UK Health and Safety Executive. This assessment has used occupational health and safety standards prepared by the UK's Health and Safety Executive.

The UK Health and Safety Executive sets workplace exposure limits (WELs) in order to protect the health of workers. WELs are concentrations of pollutants in air over a given averaging period. The time periods used are:

- Long term (8 hours)
- Short term (15 minutes)

Table 5.3 presents the appropriate NO_2 WELs adopted for the Scheme. The UK Health and Safety Executive does not set limits for dust, but the US NIOSH recommended exposure limit (REL) is set at 10mg/m^3.

Table 5.3: Relevant workplace exposure limits

Pollutant	Occupational Standards	Concentration mg/m^3
Nitrogen dioxide (NO_2)	Short term 15 minute	1.91
	Long term 8 hour	0.96

Source: http://www.hse.gov.uk/pubns/priced/eh40.pdf

5.2.2 Construction Phase – Human Health

5.2.2.1 Construction dust impact assessment criteria

Dust deposition can be expressed in terms of mass per unit area per unit time, e.g. mg/m^2/month. A range of criteria from 133 to 350mg/m^2/month is found around the world as representative of thresholds for significant nuisance.

In this instance, it is considered that a quantitative approach is inappropriate and unnecessary for assessing dust emissions associated with the construction of the Scheme, due to the nature of fugitive dust emissions. The potential for construction activities to raise dust, and the likely consequences of dust emissions have instead been assessed qualitatively.

Effects have been assigned a level and determined to be either significant or not significant, using the overarching framework presented in Chapter 4 in accordance with the magnitude of impact and sensitivity of a receptor. Specific magnitude and sensitivity criteria used in the assessment of construction phase air quality impacts are presented in the following sub-sections

5.2.2.2 Magnitude

The first stage of the assessment identifies the construction activities which have the potential to cause dust emissions and the degree of that potential. Typical construction activities which result in dust emissions are presented in Table 5.4 along with their dust raising potential.

Table 5.4: Relevant generic dust generating activities

Potential dust emitting activities	Description	Assumed dust raising potential for this Scheme
Soil handling	Potential to be high in dry season	High
Loading Activities	Potential to be high, depends on time of year and soil dryness	High
Storage of materials on-site	Potential to be high, depends on time of year and soil dryness	High
Transport of materials within site	Can be high depends on type of transport and nature of road surface	High
Drilling and digging activities (including soil excavation)	Can be high depending on type of drilling and digging activities	High
Transport of material offsite	Can be low to medium depending on road condition	Medium
Concrete batching	Generally high due to handling of bulk dry materials	High
Landscaping	Tree planting, installation of lighting, general site finishing works	Low

Source: Table adapted from:
a) Minerals Policy Statement 2: Controlling and Mitigating the Environmental Effects of Minerals Extraction in England, Annex 1: Dust
b) Building Research Establishment (2003). The 'Control of Dust from Construction and Demolition Activities'.

Table 5.5 uses the dust raising potential and duration of construction works to determine the magnitude of impacts from construction activities. Selected information from Table 5.5 has been used within this assessment to determine impacts of the Scheme with respect to construction dust.

Table 5.5: Criteria for determining dust impact magnitude – construction phase

Dust raising potential	Duration	Impact magnitude
High	> 3 months	Major
High	< 3 months	Moderate
Medium	> 3 months	Moderate
Medium	< 3 months	Minor
Low	> 3 months	Minor
Low	< 3 months	Negligible

5.2.2.3 Sensitivity

In the second stage of the assessment, worst case sensitive receptors within 500m of construction activities with the potential to be significantly affected by construction dust emissions have been identified. The assessment was based on the 'worst-case' (i.e. highest sensitivity) receptor. The distances from source at which construction dust impacts are felt are dependent on the extent and nature of mitigation measures, prevailing wind conditions, rainfall and the presence of natural screening by, for example, vegetation or existing physical screening, such as boundary walls on a site. Receptor classification (refer to Table 5.6) is combined with the distance from source to determine the sensitivity of the receptor as shown in Table 5.7.

Table 5.6: Receptor classification

High	Medium	Low	Negligible
Hospitals	Residential areas Schools National Park/protected areas	Agricultural land	Rivers

Source: Mott MacDonald, adapted from Institute of Air Quality Management (2014) Guidance on the assessment of dust from demolition and construction.

Table 5.7: Identification of sensitivity of receptors

Classification of Receptor	Distance from source			
	0–50m	50–100m	100–200m	200–500m
High	High	High	Medium	Low
Medium	Medium	Medium	Low	Low
Low	Medium	Low	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

5.2.2.4 Emissions of Combustion-Related Pollutants

Combustion-related pollutants may be emitted from construction vehicles and on-site construction plant. Emissions from on-site construction plant are not expected to be significant and have not been assessed further due to the numbers required, the distance from sensitive receptors and the limited construction period; nevertheless, best practice mitigation measures have been included in Section 5.4.4 to minimise these impacts.

The construction phase has the potential to increase traffic on nearby roads, notably the Kampala – Jinja trunk road (A109) and the old Jinja Road. It is estimated that at the peak of the construction period, which would last for a period of approximately 18 months, there would be a total of 1,283 additional vehicle movements per day. During the remainder of the construction period there would be significantly lower volumes of construction traffic. It has been assumed

that the same split of construction traffic as assumed within the operational phase, presented in Section 5.2.4, would use the Kampala to Jinja Highway and the Old Kampala to Jinja Road.

The assessment of additional construction traffic has been undertaken considering the existing traffic flows and the predicted increases during the peak construction period. The assessment has been undertaken using the equations presented within the UK Highways Agency's Design Manual for Roads and Bridges and supplemented with emissions from the UK's Department for Environment and Rural Affairs (Defra) Emission Factor Toolkit. Although UK guidance, the outputs have been compared to monitored air quality data to test that that the approach appropriate. Further details on traffic assumptions used and the approach to determining significance are presented in Operation phase methodology.

5.2.3 Construction Phase – Occupational Health

Following the results of the ground investigation surveys, potential dust generated during the construction phase are not considered to have a significant effect on occupational health and have not been considered further. Nevertheless, appropriate mitigation has been included in Section 5.4.4.

Emissions from on-site construction plant are not expected to be significant and have not been assessed further due to the numbers required, and the relevant occupational exposure standards that have been adapted for this assessment not being at risk of exceedance. Therefore, it can be concluded emissions from construction plant will not have a significant on occupational.

5.2.4 Operation Phase

5.2.4.1 Operation Phase Traffic

The completion of the KIBP will facilitate the influx of a variety of businesses, although each of these will be required to undergo their own assessments to obtain the relevant permissions. Nevertheless, an assessment of the potential cumulative traffic impacts for a future year following occupation of the KIBP has been assessed within this ESIA.

Considering the limited information regarding traffic flows in the region, existing traffic flows for 2019 and future traffic flows for 2023 have been derived from traffic counts undertaken as part of this ESIA. The existing and future traffic flows used in the assessment are presented in Table 5.8.

Table 5.8: Assumed traffic data

Road	2019 traffic flows		2023 without KIBP		2023 year with KIBP	
	Vehicles per day	% HGV	Vehicles per day	% HGV	Vehicles per day	% HGV
Jinja Highway	17,783	19.9	20,000	19.9	24,319	29.3
Old Jinja Road	9,400	15.5	10,572	15.5	12,423	24.1

Notes: Existing and future baseline traffic derived from traffic counts undertaken as part of ESIA. 6-hour traffic counts undertaken for two consecutive days in May 2019 have been factored to determine 24 hour flows.

The assessment has been based upon the most up to date assumptions regarding operational traffic movements and assumes a total of 9,000 trips from heavy goods vehicles (HGVs) and 1,670 daily minibus journeys for operational staff. The assessment has assumed operational vehicles movements will be spilt as presented in Table 5.9: The 9,000 HGV trips has been taken

from the latest Master Plan for the site, and although this does not fully reflect the potential maximum number of operational movements from the site it has been used to represent the number of HGVs in 2023. 2023 has been used as the future assessment year and is likely to represent the worst case in terms of air quality. This is because post 2023, it is expected that the new Kampala to Jinja Expressway will be operational and that this will result in major redistribution of reginal traffic and reduction in flows on the Kampala to Jinja Highway.

Of the 9,000 HGV movements it has been assumed that 70 percent of the vehicles will travel on the Kampala to Jinja Highway and 30 percent on the Old Kampala to Jinja Road and of these, half will travel in an easterly and half will travel in a westerly direction. It has conservatively been assumed that all workers travelling by minibuses will travel from Kampala and it is assumed that 70 percent of the minibuses will travel on the Kampala to Jinja Highway and 30 percent on the Old Jinja Road.

Table 5.9: Assumptions related to operational traffic movements

	Jinja Highway west of KIBP	Jinja Highway east of KIBP	Old Jinja Road west of KIBP	Old Jinja Road east of KIBP
HGV movements	3,150	3150	1,350	.1,350
Minibuses	1,670	-	-	-

Notes: Based on available information and Mott MacDonald assumptions

5.2.4.2 Assessment Approach

The assessment has been undertaken using the equations presented within the Highways Agency's Design Manual for Roads and Bridges and supplemented with emissions from Defra's Emission Factor Toolkit. Emissions assumed in the toolkit have been adjusted to take account of the older fleet and more polluting vehicles present within Uganda compared to the UK. Table 5.10 presents the approach and assumptions used in the assessment.

Table 5.10: Summary of assumptions used in assessment

Parameter	Assumption
Conversion of NOx to NO_2	The assessment has assumed a 50% conversion rate of NOx to NO_2
Background NO_2 concentrations	The assessment has assumed a background concentration of 10µg/m^3 and is based on the monitoring data collected as part of the ESIA at locations away from emission sources
Speed	The assessment has assumed the traffic is travelling at 40kph on the Jinja Highway and 30kph on the Old Jinja Road
Pollutants considered	The assessment of impacts has considered NOx and NO_2 only and has not assessed PM_{10} and $PM_{2.5}$. Due to the large amounts of resuspension of PM_{10} and $PM_{2.5}$ along the roads the assessment could not robustly predict pollutant concentrations. Without long term continuous automatic monitoring of PM_{10} and $PM_{2.5}$ in close proximity to the KIBP it is not possible to address these uncertainties and therefore the assessment of NOx has been used as a proxy for other pollutants to propose appropriate mitigation

5.2.4.3 Significance Criteria – Operational Phase

The General EHS Guidelines classify 'poor quality airsheds' as those where relevant standards are exceeded significantly. Therefore, receptors experiencing baseline ambient pollutant concentrations above the relevant standards are concluded to be of 'high' sensitivity.

For each of the pollutants considered, different air quality standards are applicable. Table 5.11 presents the determination of impact magnitude and Table 5.12 presents the determination of receptor sensitivity for the operational phase.

Table 5.11: Determination of impact magnitude – operation phase

Change in concentrations as % of standards	Magnitude
Increase >25%	Major
Increase 15-25%	Moderate
Increase 5-15 %	Minor
Increase <5%	Negligible

Table 5.12: Determination of receptor sensitivity – operation phase

Ground level pollutant concentrations in relation to standard	Receptor sensitivity
Above standard	High
75 – 100% of the standard	Medium
50-75% of the standard	Low
Below 50% of the standard	Negligible

5.2.5 Limitations and Assumptions

The assessment of air quality impacts has been based on the most up to date and best information available at the time of assessment. The assessment of construction and operation traffic has been based on assumptions as set out within the methodology.

In order to address uncertainty with the equations presented within the Highways Agency's Design Manual for Roads and Bridges and supplemented with emissions from Defra's Emission Factor Toolkit, the 2019 traffic flows have been used to calculate pollutant concentrations along the Kampala to Jinja Highway and Old Kampala to Jinja Road and compared against monitored data. Calculated pollutant concentrations were broadly in line with monitored concentrations and indicated that the assumptions used within the assessment are appropriate.

5.3 Baseline

Existing ambient air quality monitoring data within Kampala and around the KIBP is limited. In 2014, a study was undertaken in Kampala and Jinja to monitor PM (particles with an aerodynamic diameter of less than 2.5 microns ($PM_{2.5}$)), NO_2, and sulphur dioxide (SO_2). Kampala and Jinja include residential areas, many with unpaved roads, high commercial activities, small scale manufacturing and high volumes of traffic. Monitoring sites during this study comprised of commercial, industrial and residential locations the closest being in Kireka approximately 4km from the KIBP. The study published in the International Journal of Environmental Research and Public Health concluded that annual mean $PM_{2.5}$ concentrations recorded were 5.3 times higher than WHO guideline values, whilst NO_2 and SO_2 concentrations did not exceed the WHO guidelines.[6]

5.3.1 Particulate Matter

A partnership between AirQo (which is an air quality initiative to which has designed and developed portable air quality monitors named AirQo) and the Kampala city administration was formed to monitor particulate matter. 25 AirQo G2 laser particle-counting monitors were deployed as part of an initiative to monitor urban ambient air quality, using fixed and mobile low-cost technology monitoring equipment across Uganda.

[6] Kirenga, BJ et al, The State of Ambient Air Quality in Two Ugandan Cities: A Pilot Cross-Sectional Spatial Assessment July 2015

There are three monitors in close proximity to KIBP in the following locations, which are currently monitoring $PM_{2.5}$ at:

- Kireka to the west of the KIBP within a few metres of the Jinja road, at the junction of the Kamuli road and Kinawataka road where there is a number of shops and slow moving un-managed traffic.
- Mukono to the east of the KIPB, located on the Kayunga – Bugerere road, approximately 300 metres from the Jinja road.
- Bugoloobi to the south west of the KIBP and in a well-developed residential area, away from busy roads.

No long-term averages are available from the study, however monitoring data for the previous three-day periods are available to observe and download from the AirQo website (https://www.airqo.net/home). Table 5.13 presents the results from a three-day period in May 2019 and demonstrates that concentrations at the Kireka site are the highest. Although this three-day set of data is not an annual mean, it has been compared to the annual mean standards applied to the assessment and it shows that indicatively the monitored concentrations are above the applicable standards (see Section 5.2.1). At the Bugolobi site, concentrations are lowest and below the standards that have been applied to the assessment for $PM_{2.5}$. However, at the Mukono location, concentrations are above the relevant standards. This demonstrates that away from the busy main road, $PM_{2.5}$ concentrations are much lower, indicating that background concentrations are generally low with high concentrations encountered within close proximity to busy roads and where there is heavy congestion / unmanaged traffic and the resuspension of particulates by vehicles.

Table 5.13: Average three-day $PM_{2.5}$ concentration from across 19th to 22nd May 2019

Monitoring site	Kireka	Mukono	Bugoloobi
Average $PM_{2.5}$ concentration ($\mu g/m^3$)	79.4	50.3	19.1

Source: www.airqo.net

In addition to reviewing this data, and because the draft national standards are set for TSP rather than $PM_{2.5}$, a short-term five-day monitoring campaign was undertaken as part of this ESIA at six locations around the KIBP, commencing on 6th May 2019. Monitoring was undertaken for one hour each day in each location using a using is a Casella CEL-712 Microdust portable professional dust monitor. The monitoring locations are presented in Appendix 5.1 and a summary of the results are presented in Table 5.14.

A comparison of the one-hour monitoring results against the 24-hour draft national ambient air quality standard for TSP indicates that the concentrations do not exceed the standard of $300\mu g/m^3$. The monitoring also shows the highest concentrations have been recorded adjacent to the Jinja road, which is consistent with the $PM_{2.5}$ monitoring that is undertaken by AirQo.

Table 5.14: TSP monitoring results (μ/m^3)

Date	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
6th May 2019	13	20	23	43	101	17
7th May 2019	12	11	24	65	63	13
8th May 2019	25	4	25	67	98	18
9th May 2019	12	22	25	79	71	16

Date	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
10th May 2019	21	24	18	99	86	73
Average	16.6	16.2	23	70.6	83.8	27.4

Notes: Concentrations are hourly averages

5.3.2 NO_2

An initiative between Kampala Capital City Authority (KCCA) and NEMA to monitor NO_2 around Kampala[7] has recently been implemented. From December 2017, passive samplers called diffusion tubes have been set up to monitor NO_2 on a monthly basis. However, diffusion tube monitoring locations and results have not been made publicly available.

Therefore, to provide background NO_2 pollutant concentrations a site specific NO_2 monitoring survey was undertaken for a period of two months from the end of April 2019 at 15 locations. The monitoring was undertaken using diffusion tubes which provide long terms averages to indicatively compare against annual mean concentrations. The locations of the monitoring survey included areas within the KIBP, sites along the Kampala to Jinja Highway and within local communities and are presented in Appendix 5.2. A summary of the results is presented in Table 5.15.

The results of the survey indicate that at locations in close proximity to the Kampala to Jinja Highway, NO_2 concentrations are above the annual mean draft national standard of 40µg/m^3. However, at monitoring locations in excess of 100 metres from the Kampala to Jinja Highway, concentrations decease to approximately half of the draft national annual standard.

Table 5.15: Scheme specific NO_2 monitoring (µg/m^3)

Location	Easting	Northing	Month 1	Month 2	Average
1	465083	39304	22.2	21.2	21.7
2	463976	38617	19.3	17.3	18.3
3	462954	38716	15.2	25.4	20.3
4	466199	35637	8.6	5.9	7.3
5	466477	38515	20.9	27.1	24.0
6	465981	40001	9.5	31.2	20.4
7	464524	40543	16.8	19.7	18.3
8	466746	39903	27.0	19.0	23.0
9	465133	39533	43.8	38.0	40.9
10	466598	40279	58.3	40.1	49.2
11	464316	37500	4.5	5.4	5.0
12	467976	36870	Missing	18.3	18.3
13	462670	38985	Missing	Missing	-

Notes: UTM 36NKey Pollutants, missing data was due to monitoring equipment being removed or vandalised by members of the public

[7] Kampala City Air accessed on 3 April 2019 from http://mappingforchange.org.uk/2019/01/kampala-city-air/

5.4 Assessment of Effects

5.4.1 Construction Impacts and Effects

The construction phase for the KIBP will last for approximately three years and will include the necessary mobilisation works, such as site clearance. The main elements that will be constructed as part of the KIBP include:

- Internal road network and bridge
- Water supply
- Sewerage network
- Power services
- Fibre optic services and CCTV services
- Street lighting
- Ancillary works

The construction of these will include significant amounts of earthworks, rock fill and concreting/road surfacing alongside other potentially dust raising activities.

The site is made up of multiple sectors known as North, South A, South B and South C. However, the construction of all areas will take place simultaneously across the whole site rather than in phases.

5.4.1.1 Dust raising magnitude

The likely duration, dust raising potential and overall impact magnitude for each of the construction activities are presented in Table 5.16: For a worst case assessment it has been assumed that the main dust raising activities will occur across the majority of the three year construction period and therefore it has been assumed that all activities would coincide with the dry season where the dust raising potential is highest.

Table 5.16: Key construction activities and associated impact magnitude

Description of works	Key activities	Dust raising potential	Duration	Impact magnitude
Site preparation, site levelling, import of rock fill	Earthmoving Land/vegetation clearance Transport and handling of soil/materials Re-suspension of dust on unsurfaced roads	High	> 3 months	Major
Construction of roads and bridges	Earthmoving Open excavation Preparation of materials (cutting, grinding) Transport of materials to and within site Re-suspension of dust on unsurfaced roads	High	> 3 months	Major
Construction of key infrastructure	Earthmoving Open excavation Preparation of materials (cutting, grinding) Transport of materials to and within site Re-suspension of dust on unsurfaced roads	High	> 3 months (per location)	Major

Description of works	Key activities	Dust raising potential	Duration	Impact magnitude
Ancillary works and installation of lighting	Installation of prefabricated items Tree planting De snagging	Low	> 3 months	Minor

Taking the dust raising potential and the duration of the works into account, the magnitude of dust impacts is considered to be ‘major’ for the construction activities and ‘minor’ for the final ancillary works.

5.4.1.2 Receptor sensitivity

Appendix 5.3 presents the boundary of the KIBP and construction buffers for 200 metres and 500 metres. There are large numbers of residential dwellings located in the surrounding villages within 500 metres of boundary. Considering there are residential receptors located adjacent to the boundary within 50 metres the overall receptor sensitivity has conservatively been assessed as being medium around the whole KIBP boundary as defined in Table 5.6 and Table 5.7.

5.4.1.3 Construction dust significance

In accordance with the significance matrix presented in Section 4.8.3, effects on sensitive receptors resulting from dust-creating impacts during the site preparation, construction of roads and bridges and construction of other key infrastructure are described as major adverse and are considered significant. Effects from dust during the final ancillary works are described as minor adverse and are therefore not considered to be significant.

To mitigate potentially significant effects, appropriate good practice dust mitigation measures have been presented in Section 5.4.4.1.

5.4.1.4 Construction traffic

The construction traffic assessment has been based on the peak construction traffic flows. Table 5.17 presents the changes in predicted concentrations along the Kampala to Jinja Highway and the Old Kampala to Jinja Road with and without the KIBP construction traffic flows. The results indicate that NO_2 pollutant concentrations will remain above the draft annual national standards of 40µg/m^3 along the Kampala to Jinja Highway and the construction traffic will result in a 3.5 percent increase in annual mean concentrations. In accordance with the significance criteria (for construction road traffic the same approach for determining impact magnitude and receptor sensitivity as the operational traffic assessment has been used) the level of effect is described as negligible which is not considered a significant effect. Nevertheless, suitable mitigation measures consistent with those included in the IFC EHS General guidelines are presented in Section 5.4.4 to further reduce the impacts and resulting effects.

Table 5.17: Predicted Annual mean pollutant concentrations (µg/m^3)

Location	2019 Without KIBP construction flows	2019 With KIBP construction flows	Change %	Impact Magnitude	Receptor Sensitivity	Evaluation of Effects	Significance of Effects
Jinja Highway	44.4	46.0	3.5	Negligible	High	Negligible	Not significant
Old Jinja Road	25.7	26.4	2.9	Negligible	Low	Negligible	Not significant

5.4.2 Operational Impacts and Effects

The operation assessment has been undertaken for an interim year of 2023 and based on the inputs presented in Section 5.3.

Table 5.18 presents the changes in predicted concentrations along the Jinja highway and the Old Jinja Road in 2023 with and without the KIBP. The results indicate that for NO_2 pollutant concentrations will remain above the draft annual national standards and the KIBP will increase concentrations by 48.2 percent along the Jinja Highway. In accordance with the significance criteria adopted for this assessment, the effects on sensitive receptors from NO_2 creation as a result of operational impacts are considered significant. Mitigation measures are presented in Section 5.4.4 to further reduce these effects.

Table 5.18: Predicted NO_2 annual mean pollutant concentrations (µg/m^3)

Location	2023 Without KIBP	2023 With KIBP	Change %	Impact Magnitude	Receptor Sensitivity	Evaluation of Effects	Significance of Effects
Jinja Highway	48.7	72.2	48.2	Major	High	Major	Significant
Old Jinja Road	27.7	39.3	42.0	Major	Low	Moderate	Significant

5.4.3 Summary of Construction and Operation Impacts and Effects Pre-Mitigation

Table 5.19 presents a summary of the construction and operation impacts and effects on air quality and their likely significance, before the application of mitigation.

Table 5.19: Summary of construction and operation impacts and effects, pre-mitigation

Receptor	Summary of impact	Adverse / beneficial	Permanent / Temporary	Impact Magnitude	Receptor Sensitivity	Evaluation of Effect	Significance of Effect
Construction phase							
Sensitive receptors such as residential	Dust nuisance from	Adverse	Temporary	Major	Medium	Major	Significant

Receptor	Summary of impact	Adverse / beneficial	Permanent / Temporary	Impact Magnitude	Receptor Sensitivity	Evaluation of Effect	Significance of Effect
dwellings within 500m of site boundary	construction activities						
Receptors adjacent to Jinja Highway and Old Jinja Road	Increased pollutant concentrations as a result of emissions from construction traffic	Adverse	Temporary	Negligible	High to low	Negligible	Not Significant
Operational phase							
Receptors adjacent to Jinja Highway and Old Jinja Road	Increase pollutant concentrations as a result of emissions from operation traffic	Adverse	Permanent	Major	High to low	Major to Moderate	Significant

5.4.4 Mitigation Measures

5.4.4.1 Construction Mitigation

This section presents mitigation measures to manage potential air quality impacts during construction and operation. The mitigation measures presented are based on the potential impacts identified above and are in alignment with the IFC EHS guidelines.

The assessment has shown that significant air quality impacts could occur as a result of dust emissions and the resuspension of dust during the construction phase, specifically associated with the site preparations and construction activities associated with the site infrastructure. This section describes specific mitigation measures that will be implemented to prevent and minimise these construction dust impacts. Preventative measures such as best practice site management, effective site planning/layout and imposing vehicle speed limits will be implemented to minimise dust emissions at source. A range of remedial or suppressive methods will then also be applied to control dust once released.

The IFC General EHS Guidelines provide general air emission abatement techniques to consider during construction (and decommissioning) of a project. Relevant measures from the guidelines which will be included within the Scheme's ESMP are:

- Minimising dust from material handling sources, such as conveyors and bins, by using covers and/or control equipment such as water suppressors
- Minimising dust from open area sources, including storage piles, by using control measures such as installing enclosures and covers, and increasing the moisture content
- Implementing dust suppression techniques on unpaved roads, such as applying water or non-toxic chemicals to minimize dust from vehicle movements
- No bonfires and burning of waste materials shall be allowed
- Planning land clearing, removal of topsoil and excess materials, location of haul roads, tips and stockpiles with due consideration to meteorological factors (e.g. precipitation, temperature, wind direction, and speed) and location of sensitive receptors
- Designing, installing and applying a simple, linear layout for materials-handling operations to reduce the need for multiple transfer points
- Compacting and periodically grading and maintaining roads
- Vegetating exposed surfaces of stockpiled materials.

Emissions from mobile sources (on-road, off-road vehicles and mobile crushers), in both the construction and operation phases should comply with national requirements and the following measures, adapted from the EHS Guidelines for Air Emissions and Ambient Air Quality, will be considered:

- Regardless of the size or type of vehicle, owners / operators will implement the manufacturer recommended engine maintenance programmes
- Enforce a speed limit for HGVs on-site at 20km per hour
- Drivers will be instructed on the benefits of driving practices that reduced both the risk of accidents and fuel consumption, including measured acceleration and driving within safe speed limits
- Enforce a 'no-idling' policy
- Old construction vehicles will be replaced with newer more fuel-efficient alternatives where possible

- Convert high use vehicles to cleaner fuels where possible
- Install and maintain emission control devices such as catalytic convertors
- Implement a regular vehicle maintenance and repair program

With regards to any generators used on site, consideration should be given to the location and height of exhaust pipes to ensure proper dispersion of pollutants. Generators used should be of a modern design and well-maintained to minimise air pollutant emissions.

Managing the blending, packing, loading, unloading and use of bulk cement for batching plants will also be necessary. The following best available techniques will be incorporated to help manage and control dust emissions from these activities:

- Containment of dusty processes: containment and arrestment is the preferred option for control of emissions to air from processes handling cement
- Suppression of dust using water or proprietary suppressants. Where water is used for dust suppression, processes require an adequate supply of water. To demonstrate an adequate water supply on tanks, a low-level alarm will be fitted.
- Protection of external sources, such as stockpiles and external conveyors, from wind whipping is necessary. There are various methods that may be used to this end. Crushed rock, sand or coarse aggregate, can be delivered, stored and handled so as to minimise dust emissions, for example by dampening or covering.

Daily visual inspections should be undertaken at construction areas across the site by a suitably qualified/experienced member of the construction team throughout the construction phase to monitor the implementation and effectiveness of prescribed mitigation measures.

The Contractor will be responsible for ensuring the measures included in this report and the ESMP are implemented during the construction of the Scheme.

Where high dust raising activities are undertaken during the dry season it is recommended that that workers are provided with dust masks.

5.4.4.2 Operation Mitigation

As a minimum during operation all vehicles should meet the requirements as set out within the construction mitigation presented above.

It is recommended that prior to NEMA granting approval for each of the individual activity within the KIBP each application should demonstrate how they will minimise road traffic associated with their development and seek where possible to use other means of transport such as rail. For developments which result in large number of HGV movements it is suggested NEMA require these companies to utilise the newest and least polluting vehicles and could implement a maximum age on associated vehicles.

Following the opening of the Jinja Express Way regional traffic movements and traffic generated by the KIBP would be significantly affected leading to likely large improvements in air quality along the Jinja Highway and the Old Jinja Road.

5.4.5 Residual Effects

Table 5.20 presents the residual effects of the Scheme upon air quality following the implementation of mitigation.

Table 5.20: Summary of residual effects on air quality, after the application of mitigation

Receptor	Summary of Impact	Permanent or Temporary	Adverse / Beneficial	Magnitude of Impact	Sensitivity of Receptor	Effect Evaluation	Significance of Effect
Construction phase							
Sensitive receptors such as residential dwellings within 500m of site boundary	Dust nuisance from construction activities	Temporary	Adverse	Minor	Medium	Minor	Not significant
Receptors adjacent to Jinja Highway and Old Jinja Road	Increased pollutant concentrations as a result of emissions from construction traffic	Temporary	Adverse	Negligible	High to low	Negligible	Not significant
Operation phase							
Receptors adjacent to Jinja Highway and Old Jinja Road	Increase pollutant concentrations as a result of emissions from operation traffic	Permanent	Adverse	Major to Minor depending on implementation of Jinja Expressway	High to Low	Major to Minor depending on implementation of Jinja Expressway	Likely to be not significant following implementation of Jinja Expressway

6. Biodiversity and Conservation

6.1 Introduction

6.1.1 Overview

This section presents a summary of the desktop review, survey methodologies, baseline characterisation and impact identification and mitigation for the Scheme area's biodiversity to enable comparison of the current situation with changes anticipated to biodiversity receptors as a result of the Scheme. It includes protected areas, habitats and species, with information being used from primary and secondary sources.

An overview of information disclosure and consultations undertaken as part of the ESIA process is summarised in Chapter 17. This included consultation with the National Forestry Authority (NFA), Ministry of Water & Environment (Wetlands Management Department, WMD) and National Environment Management Authority (NEMA).

This assessment describes the methodology used to assess biodiversity and conservation, identifies the Area of Influence, its baseline conditions and the sensitive receptors within it, and presents an assessment of the potential impacts to identify where significant effects are expected to arise.

6.1.2 Study Area and Area of Influence

The study area for designated sites includes a 10km buffer from the Scheme footprint and is shown in Appendix 6.2. The study area for fauna and flora includes a 2km buffer from the Scheme footprint and is shown in Appendix 6.2.

The AoI for biodiversity has been defined as the Scheme footprint (see Figure 2.3), unless otherwise stated in the species sections in Chapter **Error! Reference source not found.**.

6.2 Policy and Legislation

In addition to the applicable overarching policy and legislation for the Scheme that is presented in Chapter 293, there is some further policy and legislation which specifically relates to biodiversity for the Scheme.

This Section presents this information in addition to that presented in Chapter 3.

6.2.1 Regulatory Framework for Biodiversity Protection

National legislation and policy in Uganda relating to biodiversity applicable to the Scheme is shown in Table 6.1.

Table 6.1: National legislation or policy related to biodiversity

Legislative or policy instrument	Relevant details
National Environment Act 1995	See Chapter 3
Water Act 1997	See Chapter 3
Uganda Wildlife Act 1996	An Act to provide for sustainable management of wildlife; to consolidate the law relating to wildlife management; to establish a coordinating, monitoring and supervisory body for that purpose and for other matters incidental to or connected with the foregoing.

Legislative or policy instrument	Relevant details
National Forestry and Tree Planting Act 2003	An act to provide for the conservation, sustainable management and development of forests for the benefit of the people of Uganda; to provide for the declaration of forest reserved for the purposes of protection and production of forests and forest produce; to provide for the sustainable use of forest resources and the enhancement of the productive capacity of forest; to provide for the promotion of tree planting; to consolidate the law relating to the forest sector and trade in forest produce; to establish a National Forestry Authority; to repeal the Forests Act, Cap.246 and the Timber (Export) Act Cap.247; and for related matters.
Plant Protection Act 1937	An Act to make provision for the prevention of the introduction and spread of disease destructive to plants.
The National Environment (Wetlands, River Banks And Lake Shores Management) Regulations, No. 3/2000	The objective of these regulations is to: provide for the conservation and wise use of wetlands and their resources in Uganda, give effect to clause 2 of article 237 of the constitution of Uganda, ensure water catchment conservation and flood control, ensure the sustainable use of wetlands for ecological and tourist purposes for the common good of all citizens, ensure that wetlands are protected as habitats for species of Fauna and Flora, provide for the regulated public use and enjoyment of wetlands, enhance research and its related activities, minimise and control pollution. Section 29, Part (2), of the Regulation states that 'Rivers not specified in the Sixth Schedule shall have a protected zone of thirty metres from the highest water mark of the river'. Section 30, Part (1) states that 'All shores of lakes specified in the Seventh Schedule [Lake Victoria is in the 7th Schedule] to these Regulations shall have a protected zone of two hundred metres measured from the low water mark'.
National Environment (Audit) Regulations, 2006	These Regulations, made by the Minister responsible for the National Environment Act under section 107 of the National Environment Act, provide for a systematic, periodic and objective evaluation carried out to determine: how well a facility is performing in conserving the environment and its resources; the facility' s compliance status with environmental regulatory requirements and the environmental management system; the overall environmental risk of the facility. These Regulations apply to: a) The enforcement of section 3(3)(c) of the Act; (b) all environmental audits required by section 22 of the Act; (c) all environmental audits required by the National Environment (Environmental Impact Assessment) Regulations; (d) voluntary environmental audits; (e) such other environmental audits as may be required or prescribed.
The Environmental Impact Assessment Regulation, S.I. No. 13/1998.	These Regulations apply to all projects listed in the Third Schedule to these Regulations and major repairs, extensions, or routine maintenance of existing projects included in the Schedule (reg. 3). The Technical Committee on Environment Impact Assessment established under section 11 of the Environment Statute of 1995 shall provide advice to the Board and Executive Director of the National Environment Management Authority on technical issues related to environmental impact assessment (reg. 4). A developer shall prepare a project brief stating the information included in regulation 5. Such briefs shall be submitted to the Executive Director (reg. 6). The lead agency, which is an agency to whom the Authority delegates its functions under comma 2 of section 7 of the Statute, shall make comments on the brief in accordance with procedures laid down in regulation 7. The project brief shall be approved by the Director if no major impact on the environment results from the brief or if the brief discloses sufficient mitigation measures to cope with possible effects on the environment (sect. 9). Sections 10 to 12 deal with environmental impact studies upon the completion of which a developer shall make an environmental impact statement in accordance with sections 13 to 16. Sections 17 to 23 make provision for the review of the environment impact statement, whereas sections 24 to 28 deal with decisions of the Director on such statements. The last part of the Regulations (regs. 29-39) provides for access to information contained in environment documentation referred to in these Regulations and for some miscellaneous matters.
National Policy for the Conservation and Management of Wetland Resources, 1995	See Chapter 3
Uganda's National Biodiversity Strategy and Action Plan II (NBSAP) (2015 – 2025)	Uganda's first NBSAP (NBSAP1) was completed in 2002. The revised NBSAP (NBSAP2) was completed in 2015. NBSAPII addresses the key concerns regarding biodiversity management in Uganda. The vision of Uganda's NBSAPI is "to maintain a rich biodiversity benefiting the present and future generations for socio-economic development". The goal is "to enhance biodiversity conservation, management and sustainable utilisation and fair sharing of its benefits by 2025" using seven strategic objectives.

Source: Mott MacDonald summaries of national laws

6.2.2 Conventions

In addition to the policy and legislation outlined above for biodiversity, there are conventions applicable to biodiversity that have been ratified by Uganda. These are detailed below in Table 6.2.

Table 6.2: International Agreements and Conventions ratified by Uganda for biodiversity

International Environmental Agreement	Date of signature	Approval date
Charter of the United Nations (UN)	1962	1962
Convention on Biological Diversity (CBD) (Rio de Janeiro)	1992	1993
United Nations Framework Convention on Climate Change (UNFCC) (Rio de Janeiro)	2016	2016
Kyoto Protocol to the Framework Convention on Climate Change	2002	2015
Cartagena Protocol on Biosafety	2000	2001
Ramsar International Convention on Wetlands of International Importance, especially as waterfowl habitats	1988	1988
Convention on International Trade in Endangered Species of Wold Fauna and Flora CITIES (Washington)	1991	1991
Convention on the Conservation of Migratory Species of Wild Animals CMS (Bonn)	2000	2000
African Convention on the Conservation of Nature and Natural Resources (Revised Version) (Maputo)	2003	-
Convention concerning the protection of world cultural and natural heritage UNESCO	1962	1962
Convention for the Establishment of the Lake Victoria Fisheries Organisation	1994	1994

Key conventions are described in more detail below.

6.2.2.1 Convention on Biological Diversity (CBD)

Uganda became a signatory of CBD in June 1992 and it was ratified into national law in September 1993 (CBD, 2019). CBD defines biodiversity as “the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems”. As a signatory country, Uganda has a responsibility to:

- Safeguard its biodiversity
- Introduce procedures requiring EIA for projects likely to have significant impacts on biological diversity
- Introduce legislative provisions that ensure environmental policies and procedures are duly considered

6.2.2.2 Convention on International Trade of Endangered Species of Wild Fauna and Flora (CITES)

As a member country of CITES since 1991, Uganda is part of an international agreement between governments that aims to ensure that international trade in species of wild animals and plants does not threaten their survival. CITES Appendix I includes species threatened with extinction and prohibits international trade of these species except when the purpose of the import is not commercial i.e. for scientific research. Appendix II lists species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled. Appendix II species may be authorized by the granting of an export permit or re-

export certificate. Appendix III species need the cooperation of other countries to prevent unsustainable or illegal exploitation. International trade in specimens of species listed in this Appendix is allowed only on presentation of the appropriate permits or certificates.

6.2.2.3 Convention on the Conservation of Migratory Species of Wild Animals (CMS)

The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention or CMS) was adopted in Bonn, Germany in 1979 and came into force in 1985. Uganda ratified this convention in August 2000. The contracting parties work together to conserve migratory species and their habitats by providing strict protection for endangered migratory species (listed in Appendix I of the Convention), concluding multilateral agreements for the conservation and management of migratory species which require or would benefit from international cooperation (listed in Appendix II), and by undertaking cooperative research activities.

6.2.3 IFC Performance Standard 6

As described in Section 3.4, the IFC Performance Standards are an international benchmark for identifying and managing environmental and social risk and has been adopted by many organisations as a key component of their environmental and social risk management. IFC Performance Standard 6 (IFC PS6), as summarised in Section 3.4, considers biodiversity.

PS6 objectives are:

- To protect and conserve biodiversity
- To maintain the benefits from ecosystem services
- To promote the sustainable management of living natural resources through the adoption of practices that integrates conservation needs and development priorities

IFC PS6 requires that a conservation importance is allocated to the ecological features (protected areas, habitats and species) which are likely to be directly or indirectly impacted in the Scheme AoI. The requirements of IFC PS6 apply to projects in all habitats, whether those habitats have been previously disturbed and whether they are legally protected. Specifically, a project is required to:

- Assess significance of project impacts on all levels of biodiversity as an integral part of the social and environmental assessment process
- Consider differing values attached to biodiversity by specific stakeholders
- Assess major threats to biodiversity, especially habitat destruction and invasive alien species

In accordance with IFC PS6, habitats are divided into modified, natural and critical habitats. Critical habitats can be either modified or natural habitats supporting high biodiversity value, including:

- Habitat of significant importance to Critically Endangered and/or Endangered species (International Union for Conservation of Nature and Natural Resources (IUCN) Red List)
- Habitat of significant importance to restricted-range species
  - Habitat supporting globally significant concentrations of migratory species and/or congregatory species
- Highly threatened and/or unique ecosystems
- Areas associated with key evolutionary processes

Since habitat destruction is recognised as a major threat to the maintenance of biodiversity and to assess likely significance of impacts, IFC PS6 requires the following depending on habitat status:

- Modified Habitat: exercise care to minimise any conversion or degradation of such habitat, depending on scale of project, identify opportunities to enhance habitat, and protect and conserve biodiversity as part of operations.
- Natural Habitat: developer will not significantly convert or degrade such habitat unless no financial/technical feasible alternatives exist, or overall benefits outweigh cost (including those to biodiversity) and conversion or degradation is suitably mitigated. Mitigation must achieve no net loss of biodiversity where feasible; offset losses through creation of ecologically comparable area that is managed for biodiversity, compensation of direct users of biodiversity.

Critical Habitat: in areas of critical habitat the developer will not implement project activities unless there are no measurable adverse impacts on the ability of the critical habitat to support established populations of species described or on the functions of the critical habitat; no reduction in population of a recognised Critically Endangered or Endangered species and lesser impacts mitigated as per natural habitats.

6.3 Methodology

6.3.1 Desk Study Methodology

A desk-based review of available information from national and international sources was undertaken. This included:

- Convention on Biological Diversity website (http://www.cbd.int/)
- IUCN Red List of Threatened Species (http://www.iucnredlist.org)
- Integrated Biodiversity Assessment Tool (https://ibat-alliance.org/)
- National Red List for Uganda (WCS, 2016)
- Uganda Legal Information Institution (https://ulii.org/)
- National Forestry Authority (https://www.nfa.org.ug/)
- BirdLife International Data Zone (http://www.birdlife.org/datazone/home).
- Protected Planet (https://protectedplanet.net/country/UG)
- The Reptile Database (http://reptile-database.reptarium.cz/)
- The Amphibia Web (http://amphibiaweb.org/)
- Catalogue of Life (http://www.catalogueoflife.org/)
- The Plant List (http://www.theplantlist.org/)
- Global Invasive species database (http://www.iucngisd.org/gisd/100_worst.php)

Previous reports undertaken as part of the KIBP development have been reviewed and included:

- Environmental Impact Assessment study of Namanve Industrial and Business Park, (GIBB (Eastern Africa) Ltd, 2002)
- Environment and Social Impact Assessment (ESIA) for the earthworks in the Kampala Industrial and Business Park (KIBP) (Consult Limited, 2008)
- Environmental Impact Statement. For the proposed cooking oil and washing soap manufacturing plants to be located on plot 655, block 113, in the South C Sector, in the Kampala Industrial and Business Park – Namanve, in Kolo - Buwanyi village, Nantabulirwa parish, Goma division, Mukono municipality, Mukono district (HEBOCO, Consult Ltd, 2017)

- Environmental Impact Assessment. For the proposed plastic manufacturing industry in Nantabulirwa village, Nantabulirwa parish, Goma division, Mukono district (Feilong Investments Ltd, 2018)
- Environmental Impact Statement for the proposed rice milling plant on plot 896, block 113 in Kampala Business & Industrial Park – Namanve, in Kolo – Buwanyi village, Nantabulirwa parish, Goma division, Mukono municipality, Mukono district (FOI Logistics (U) Limited, 2016)
- Environmental and Social Impact Assessment Report of the proposed Namanve Complex for Hima Cement Limited (BIMCO Consult Ltd, 2016)

Information on the following nature conservation areas and other protected areas (existing or proposed) within the AoI and up to 10km has also been collected and reviewed from online sources:

- Ramsar Site, Wetland of International Importance (https://www.ramsar.org/)
- Key Biodiversity Areas (KBA) (www.keybiodiversityareas.org/)
- Important Bird and Biodiversity Areas (IBA) (http://datazone.birdlife.org/home)
- World Heritage Sites (WHS) (https://whc.unesco.org/en/list/)
- UNESCO Biosphere Reserves (http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/biosphere-reserves/africa/uganda/)
- National Protected Areas of Uganda (https://protectedplanet.net/country/UG):
  - Sanctuary
  - National Park
  - Wildlife Reserve
  - Forest Reserve
  - Community Wildlife Management Area
  - Wildlife Sanctuary

6.3.2 Field Survey Methodologies

Field surveys have been undertaken in 1999 and 2008 to inform the previous ESIAs, and in 2019 as part of this ESIA. Methodologies for these surveys are described below.

6.3.2.1 1999 Field Survey Methods

Field surveys were conducted within KIBP in 1999 by Professor William Banage. Flora was recorded within KIBP using the nine quadrants. Opportunistic observations and traps were laid out to record fauna data. The observations were made by following the existing foot-paths in both Namanve South A and South B. The method involved walking around the study area at different times of the day and listing the bird species as they were encountered. Notes were taken on each species, its habits and habitat, breeding sites, and abundance. The observer used 8 x 40 and 10 x 50 field binoculars and birds were identified using standard reference books for East Africa: Williams and Arlott (1980), Van Perlo (1995) and Zimmerman et al (1996). Further detailed methodology for these surveys was not available.

6.3.2.2 2008 Field Survey Methods

An opportunistic survey was carried out by Ema Consult Limited to find out the status of flora and fauna, to validate the ESIA conducted in 2002. Further details regarding the methodology are not available.

6.3.2.3 2019 Field Survey Methods

All of the KIBP sectors were visited by Mott MacDonald and EcoTrends (local biodiversity specialists associated with Q&L) on Tuesday 30th April 2019 and Wednesday 1st May 2019 to understand the current ecological conditions of the site.

A habitat map was created using Sentinel-2 (10m resolution) satellite imagery (acquired 04 February 2019) and ENVI image analysis software. The broad habitat categories from previous land cover mapping was used. Ground truthing was carried out at four locations of the KIBP (see Table 6.3 below). A rapid biodiversity assessment method was used to collect data for habitats, flora, birds, mammals, reptiles and amphibians. A rapid assessment is an accelerated, targeted, and flexible biodiversity survey, predominately focusing on species associated with particular vegetation. A limitation to this assessment approach is that it does not capture the full species list but gives an indication of habitats and species present within the site at the time. Therefore, there may be sensitive species within the study area that have not been identified. The survey was conducted in during the wet season and should therefore represent higher biodiversity in comparison to the dry season.

One transect was walked at each of the four locations and data was collected. The centre point of the transects are shown in Appendix 6.1 and Table 6.3. The North Sector was visited but no survey was undertaken as the majority of land had been converted to industrial buildings which were in use. The surveys were conducted by EcoTrends and included a specialist in ornithology and botany.

Table 6.3: Biodiversity walkover locations

Sector	Reference	Co-ordinates
South A	KP4	36 N 465024 39196
South A	KP3	36 N 465923 39298
South B	KP2	36 N 465340 37702
South C	KP1	36 N 466570 36240

Source: Mott MacDonald, 2019

All habitat types and flora species were recorded at each location by a local botanist. The DAFOR scale (Dominant, Abundant, Frequent, Occasional and Rare) was used when recording each plant species to provide an estimate of the relative abundance in the area.

The bird species seen and heard at each location were recorded by a local ornithologist. The observer used 8 x 42 magnification binoculars. Birds in the sites were identified using the standard field guide reference book: “A Field guide to the Birds of East Africa” by Stevenson and Fanshawe (2002) and their locations confirmed using “The Uganda Bird Atlas” by Carswell et al. (2005).

All reptiles, amphibians and mammals sighted during the walkover were recorded by a local ecological consultant along with signs (e.g. burrows, foraging evidence, droppings, footprints etc). Anecdotal evidence of fauna observed in the area was also recorded from farmers and local people on-site. This helped consolidate some of the mammal signs observed as well as highlight the presence of other species not recorded during the survey.

The site walkover also involved checking of wet areas for presence of amphibians and reptiles using a Visual Encounter Survey (VES). It was conducted by the observer walking through a designated area for 45 minutes; visually and systematically searching for animals. This involved a search on the ground, along streams, in the leaf litter, thickets and grass.

To highlight species of conservation concern, all species observed were checked against the IUCN Red Database and National Red List of Uganda. Specialist local knowledge and desk study research (described above) was also used to determine whether migratory, restricted-range/ or invasive species are present within the site.

The general ESIA approach is explained in Chapter 4 above. Where the methodology for biodiversity has deviated from this generic approach, the methodology for determining magnitude, sensitivity (conservation importance) and impact significance is included in this specialist section.

This assessment has considered the nature of potential unexpected ecological features and precautionary mitigation measures along with additional monitoring are included in mitigation section (see Section 6.5.5).

6.3.3 Determining Magnitude, Sensitivity, and Impact Significance

The magnitude of the potential impacts upon each ecological feature has been assessed for the construction and operation of the Scheme using the criteria presented in Table 6.4.

Table 6.4: Criteria for determining impact magnitude

Category	Definition
Major	Fundamental change to the specific environmental conditions assessed resulting in long term or permanent change, typically widespread in nature (regional national and international), would require significant intervention to return to baseline; exceeds national standards and limits.
Moderate	Detectable change to the specific environmental conditions assessed resulting in nonfundamental temporary or permanent change.
Minor	Detectable but minor change to the specific environmental conditions assessed.
Negligible	No perceptible change to the specific environmental conditions assessed.

The sensitivity (conservation importance) or weighting attributed to each ecological feature in the study area has been assessed using the criteria defined in Table 6.5.

Ecological effects are described as:

- Short (<5 years) or long term (>5 years); and
- Temporary (can be short or long term) or permanent.

Table 6.5: Criteria for determining receptor sensitivity (conservation importance)

Sensitivity Ranking	Detail	Species Criteria	Habitat or Site Criteria
Very High	Very high importance and rarity. International scale with limited potential for substitution.	IUCN Critically endangered and endangered species.	Internationally designated sites (or equal status). Habitats of significant international ecological importance.
High	High importance and rarity, national scale, or regional scale with limited potential for substitution, species of international status but not within designated areas.	IUCN Vulnerable species. Nationally protected species of significant population size and importance.	Nationally designated sites (or equal status). Areas of habitats of national ecological importance, and natural habitats of significant ecological importance and/or high biodiversity with limited potential for substitution.
Medium	High or medium importance and rarity, local or regional scale, and limited potential for substitution, species of national status but not within designated areas.	IUCN Near Threatened species. Nationally protected species or rare species, but not a significant population size and not of national importance.	Regionally-important natural habitats. Natural habitats. Modified habitats with high biodiversity or under significant threat of loss within the region.

Sensitivity Ranking	Detail	Species Criteria	Habitat or Site Criteria
Low	Very low or low importance and rarity, and local scale.	IUCN Least Concern. Species of local national importance.	Undesignated sites and habitats of natural habitats of some local biodiversity and cultural heritage interest. Modified habitats with limited ecological value. Other sites with little or no local biodiversity and cultural interest.
Negligible	Very limited ecological importance.	IUCN Least Concern species. Species of no national importance.	Highly modified habitats.

Significance has been determined by the interaction between the magnitude of impacts and the sensitivity of receptors affected, as presented in Table 4.4. Habitats and species of negligible conservation importance have not been included within this section as impacts would be considered not significant.

6.4 Baseline

6.4.1 Biodiversity Importance of Uganda

Uganda is a landlocked country located where seven of Africa's ecoregions converge (WWF, 2019). The ecoregions range from Albertine Rift montane forests to the Victoria Basin forest-savanna mosaic. Within the country, farmland is the most extensive habitat type, followed by grasslands, woodlands, water bodies, bush lands, and tropical high forests.

Uganda has 16 internationally recognised sites; two UNESCO-MAB Biosphere Reserves, two World Heritage Sites, and 12 Ramsar sites. There are also 696 nationally designated areas in Uganda; one Sanctuary, ten National Parks, 12 Wildlife Reserves, 661 Forest Reserves, five Community Wildlife Management Areas and seven Wildlife Sanctuaries.

Uganda has approximately 5,000 species of higher plants, of which 70 are endemic and mainly concentrated in tropical forests in the western region. There are approximately 380 mammal species, 1,016 species of birds, 150 reptile species, 98 species of amphibians, 324 species of fish (of which 292 are endemic to Lake Victoria), 420 species of fungi, 296 species of lichens and 8,999 species of insects (CBD, 2019).

6.4.2 Internationally-Recognised and Legally-Protected Areas

There are six legally protected areas within 10km of KIBP (Appendix 6.2). Kifi, Luvunya, and Namyoya Forest Reserves are located over 2km northeast; whilst, Nabanga and Kifunvwe Forest Reserves are located over 2km south. The closest Forest Reserve to KIBP is Namanve, which partially overlaps with the South C Sector (Appendix 6.3). Details of Namanve Forest Reserve are presented in Section 6.4.2.1 below.

There are no internationally recognised areas or other nationally protected areas for nature conservation within 10km of the Scheme.

6.4.2.1 Namanve Forest Reserve

Namanve Forest was designated in 1932 under the Forests Act, Cap. 246 which was later superseded by the National Forestry and Tree Planting Act, 2003. The original boundary of the reserve and the compartments are presented Appendix 6.3.

The Namanve Central Forest Reserve originally comprised tropical rain forest and a wetland/swamp with seven plant communities:

- Nymphaea (Waterlily) Zone;

- Fringing Papyrus Community;
- Fem and Sedge Community;
- Limnopyton Community;
- Papyrus Swamp;
- Miscanthidium Swamp; and
- Phoenix Swamp.

The high demand for electricity poles, firewood and charcoal (GIBB, 2002) necessitated the establishment of a tree plantation programme by the National Forestry Authority (NFA). Following this, the natural forest was cleared and replanted with Eucalyptus trees (*Eucalyptus robusta* and *Eucalyptus saligna*) (GIBB, 2002).

In late 1996, a statutory Instrument, shown in Appendix 6.5, states that 10.06km^2 (1006 hectares) of the Namanve Forest Reserve were excised by Government of Uganda. The compartments that were excised are 1, 2, 10, 13, 15 and 16. Calculations using the GIS shapefiles provided by the NFA, show that approximately 7.50km^2 have been excised and approximately 10km^2 remain. The excised land was placed under the ownership of UIA for the KIBP. Namanve Forest Reserve has no reported IUCN management category. Following consultation with NFA, it is understood that there is no approved management plan (see Chapter 17).

The conversion of the swamp and indigenous closed forest into eucalyptus plantation did not completely eliminate the plant biodiversity. During the surveys in 2019, remnant Phoenix and Papyrus Swamp was also recorded within KIBP. Alternations in plant communities and degradation of remaining natural vegetation has been facilitated by drainage, human disturbance, afforestation, cultivation, encroachment, livestock grazing and fire. The aquatic flora communities have, in addition, experienced changes due to siltation, water level fluctuations, eutrophication and the invasion of the lake by the alien plant species, for example water hyacinth *Eichhomia crassipies* (Consult Limited, 2008).

Approximately 0.95km^2 of the KIBP (South B Sector) overlaps with the boundary of the remaining forest reserve. The habitat types within the overlapping areas are presented in Table 6.6 and Appendix 6.4. Descriptions of the habitat types are presented in Section 6.4.3.

The remaining protected areas of Namanve Forest Reserve are considered to be of **high** conservation importance due to its legal protection.

Table 6.6: Habitat types within the overlap between Namanve Forest Reserve and KIBP

Habitat type	Natural/ Modified (status)	Area within Namanve forest Reserve (km^2)
Swamp	Natural (degraded)	0.16
Plantation	Modified	0.45
Buildings/ hard standing/	Modified	0.14
Bare ground	Modified	0.22

Source: Mott MacDonald, 2019

6.4.3 Habitats

The Scheme is located within the Victoria Basin forest-savanna mosaic ecoregion. This ecoregion is where the west African forest ecosystems converge with those from east African forest-savanna mosaics. The regions scattered lakes, rivers, and marshes add to the diversity of habitats supporting a wide variety of species.

The natural vegetation of the area was originally swamp and closed forest. The natural forest was then cleared by the NFA and replanted with Eucalyptus trees (*Eucalyptus robusta* and *Eucalyptus saligna*) (GIBB, 2002). The plantation forest was then cleared in in preparation for the KIBP. Remnant Phoenix and Papyrus Swamp and Eucalyptus trees were present during the 2019 survey.

In 2019, the developing KIBP included mosaic of remnant wetland forest vegetation and eucalyptus plantations, sweet potato and sugar cane gardens in the South B and South C Sectors. Within South A, KP3 was typically wetland flooded by water and characterised by wetland plant species while KP4, along River Namanve was characterised by remnant wetland forest plant species. The North Sector is predominantly developed, and livestock grazing was observed across all sites. There is therefore a mosaic of natural (degraded) and modified habitats within in the Scheme area. Five habitat types were present within the KIBP boundary, these are presented in Table 6.7 and Appendix 6.1.

Table 6.7: Habitat types present within the KIBP site

Habitat type	Description	Natural/ Modified (status)	Area within KIBP (km^2)	Sectors
Swamp	Habitats dominated by *Phoenix reclinate, Cyperus papyrus* and Typha species	Natural (degraded)	2.09	North, South A, B, C
Plantation	Eucalyptus, sugar cane, sweet potato	Modified	3.74	North, South A, B, C
Buildings/ hard standing/	Existing buildings and roads and areas under construction	Modified	1.18	North, South A, B, C
Bare ground	Areas cleared for development (buildings and roads)	Modified	1.86	North, South A, B, C
Open water	Ponds, River Namanve and irrigation ditches	Natural (ponds) and Modified (irrigation ditches)	<0.5	South A

Source: Mott MacDonald, 2019

6.4.3.1 Swamp

Wetland habitats are present within the KIBP boundary. In 2008, the northern portion of the North Sector was dominated by grassy areas as well as swamps with *Cyperus papyrus*, *Typha* Sp., *Phragmites australis*. A rare species of Rothmannia sp. (Rubiaceae) was also recorded. During the 2019 survey, these habitat types were no longer dominant within the North Sector. However, within South B and south of South C, phoenix swamp (indicated by the dominance of *Phoenix reclinate*) and papyrus swamp (indicated by the dominance *Cyperus papyrus*) are the main natural wetland habitat types.

They are remnants of the original swamp forest and are heavily degraded across the KIBP site due to disturbance by human activities (planting, cultivation, grazing, sand and gravel mining and brick making).

This swamp habitat type within the KIBP is considered to be of **medium** conservation importance.

Outside of the KIBP boundary (south of South B and west of South C Sectors), there are extensive wetlands. These are an extension of the wetland ecosystem which falls within the areas excised from the Forest Reserve. These are referred to as the "Namanve wetlands".

These wetland areas drain southwards into the Kayobe Swamp, which eventually opens out into Lake Victoria at Murchison Bay located to the east of Port Bell.

The swamps surrounding KIBP and Lake Victoria are considered to be of **high** conservation importance and will be considered in the impact assessment due to effluent disposal into these surrounding areas.

6.4.3.2 Plantation

The dominant habitat types in 2019 within KIBP are eucalyptus plantations and sweet potato and sugar cane plantations. The sugar cane and sweet potato plantations are associated with encroachment from local communities. The eucalyptus plantations are in association with the NFA. The dominant tree species was *Eucalyptus grandis* in the North Sector during the 2008 surveys. *Eucalyptus robusta* and *Eucalyptus deglupta* were the major tree species along the Kampala-Jinja Highway. In 2019, the majority of eucalyptus plantations have been cleared, however it is still the dominant habitat type within the KIBP.

This habitat type is considered to be of **low** conservation importance.

6.4.3.3 Buildings/ hard standing and bare ground

During the 2019 site visit, the majority of North Sector has been developed or was under construction. The areas surrounding the developments are bare ground with small patches of short grassland and regenerated scrub. Many of the areas in the South A, B and C Sectors have been cleared ready for development.

This habitat type is considered to be of **negligible** conservation importance.

6.4.3.4 Open water

The River Namanve runs north to south within the South Site A and South B Sectors. East of the river is a public footpath. Along the River Namanve, the dominant plant species observed was *Cyperus papyrus* and surrounding the river are plantations. Open pools of water and irrigation ditches were also observed between the plantations in the South A, B and C Sectors.

The river within the KIBP is considered to be of **high** conservation importance. The open pools and irrigation ditches are considered to be of **low** conservation importance.

6.4.4 Flora and Fauna

This section describes the biodiversity baseline of flora and fauna confirmed or likely to be present within the KIBP site following the 2019 survey.

6.4.4.1 Flora

The list of species received from IBAT included 99 vascular plant species (67 Liliopsida, one Lycopodiopsida, 29 Magnoliopsida and two Polypodiopsida). Of these species two (Liliopsida) are considered to be globally Near threatened, one (Liliopsida) is Data Deficient and the remaining plant species are of Least Concern.

During the 2019 surveys, 74 plant species were recorded within the KIBP. All species (except *Phoenix reclinate*) are common and widespread. The full list of species recorded during the 2019 surveys are presented in Appendix 6.6.

According to Banage (1999), the KIBP site had 15 plant species of conservation concern (rare, threatened, or have environmental and economic value). The full list of species can be found in

the 2008 ESIA (Consult Limited, 2008). Of the 15 species, four were considered to be rare or threatened. These were *Melici a excelsa*, *Trichilia dregeana Rothmannia* sp and *Phoenix reclinate*. *Phoenix reclinata* was the only species observed during the 2019 survey. It was recorded in Namanve South A, B and C and is considered threatened. It is also considered to be useful in flood control (Consult Limited, 2008). These species are considered to be of **medium** conservation importance.

None of the remaining plant species recorded during the 2019 survey were of high conservation importance i.e. listed as globally or nationally threatened (Critically Engendered/ Endangered/ Vulnerable), legally protected or range-restricted. All other species are considered to be of low conservation importance.

Invasive species

Three invasive species were present on site in 2019; *Mimosa pigra*, *Broussonetia papyrifera*, and *Lantana camara*. *Mimosa pigra* and *Lantana camara* have been nominated as among “100 of the world's worst invasive alien species” by the IUCN Invasive Species Specialist Group (IUCN, 2019b).

Mimosa pigra is an upright prickly shrub or small tree. It is native to tropical America and invasive in parts of Kenya, Tanzania and Uganda but has been naturalised for at least two centuries. It is present in floodplains, swamps, shallow dams, dried river beds, riparian zones (banks of water courses) (BioNET, 2019a). It was found to be Rare in South C, Occasional in South B and Frequent along River Namanve in the South A Sector during 2019.

Broussonetia papyrifera is a deciduous tree that grows up to 15 metres tall, sometimes higher in ideal conditions. It originated in east Asia and is invasive in parts of Uganda. It is found in forest edges and gaps, roadsides. It grows very aggressively in degraded forests as it thrives in open areas. This species has very high water consumption, which leaves less water to sustain native flora and directly competes for nutrients, space and light (BioNET, 2019b). It was found to be Rare along River Namanve in 2019.

Lantana camara is a branched, upright, arching or scrambling shrub that usually grows 2-4 m tall and forms dense thickets. It is native to Mexico, Central America, the Caribbean and tropical South America. It is invasive in large parts of Kenya, Tanzania and Uganda and is very widespread in all three countries. *Lantana camara* occurs along roadsides, in degraded lands, in riparian zones (banks of watercourses), along fence lines and in pastures and parklands, in plantations, forest edges and gaps and is seen invading native vegetation in woodlands and savannas and is poisonous to livestock (BioNET, 2019c). It was found to be Rare in the South B Sector and Occasional along River Namanve in 2019.

6.4.4.2 Birds

The list of species received from IBAT included 542 bird species within 2km of the Scheme area. Of these species, four are considered globally Critically Endangered, six are Endangered, five are Vulnerable, ten are Near Threatened and 517 are of Least Concern (IUCN, 2019). The full list of globally threatened species recorded within the study area are presented in Appendix 6.7. None of the globally threatened species highlighted in this list were observed during the surveys conducted in 2019. Following consultation with the local ornithologist, two species of the 15 globally threatened species have a likelihood of occurring within the KIBP in its current state; the grey-crowned crane *Balearica regulorum* and the Basra reed warbler *Acrocephalus griseldis*.

A total of 167 species were recorded in the KIBP area in 1999 (GIBB, 2002). Of these, 14 are highlighted as globally or nationally threatened; one species, papyrus yellow warbler *Chloropeta natalensis* is globally Vulnerable (described below), one species is globally near threatened and the remaining species are globally Least Concern. Eight species are regionally Vulnerable, and five species are of Regional Responsibility.

During the survey conducted in 2019, a total of 53 species were observed within KIBP. Of these species, no globally or nationally threatened species or restricted-range species were observed. Six species observed were migratory and are described below. The methods and results of the bird survey are presented in Appendix 6.8.

The total number of bird species of conservation importance, that are likely to occur in the protect area are indicated in Table 6.8 below. Species that were confirmed on site during the 1999 or 2019 surveys are highlighted in the table.

Table 6.8: Bird species of conservation concern

Species Name	Scientific Name	Habitat Category	Red list status (IUCN, 2019; National Red List)	Status	Source
Darter	*Anhinga rufa*	W	G-LC, R-VU	Resident	Banage, 1999; IBAT, 2019
Great white egret	*Egretta alba*	W	G-LC, R-VU	Resident	Banage, 1999
Saddle billed stork	*Ephippiorhynchus senegalensis*	W	G-LC, R-VU	Resident	Banage, 1999; IBAT, 2019
African pygmy goose	*Nettapus auratus*	W	G-LC, R-VU	Resident	Banage, 1999; IBAT, 2019
African marsh harrier	*Circus ranivoras*	W	G-LC, R-VU	Resident	Banage, 1999; IBAT, 2019
Banded snake eagle	*Circaetus cinerascens*	F	G-LC, R-VU	Resident	Banage, 1999; IBAT, 2019
White headed rough wing	*Psalidoprocne albiceps*	f	G-LC, R-RR	Resident	Banage, 1999; IBAT, 2019
White-winged swamp warbler	*Bradypterus carpalis*	W	G-LC, R-RR	Resident	Banage, 1999; IBAT, 2019
Papyrus yellow warbler	*Chloropeta natalensis*	W	G-VU	Resident	Banage, 1999
Grey-capped warbler	*Eminia lepida*	fw	G-LC, R-RR	Resident	Banage, 1999; IBAT, 2019; 2019 survey
Papyrus gonolek	*Laniarius mufumbini*	W	G-NT/R-RR	Resident	Banage, 1999
Red-chested sunbird	*Cinnyris erythrocerca*	W	G-LC, R-RR	Resident	Banage, 1999; 2019 surveys
Weyn's weaver	*Ploceus weynsi*	F	G-LC, R-VU	Resident	Banage, 1999; IBAT, 2019
Papyrus canary	*Serinus Koliensis*	W	G-LC, R-VU	Resident	Banage, 1999
Grey-backed fiscal	*Lanius excubitoroides*	fw	G-LC	AM	IBAT, 2019; 2019 surveys
African openbill stork	*Anastomus lamelligerus*	wG	G-LC	AM	IBAT, 2019; 2019 surveys
Woodland kingfisher	*Halcyon senegalensis*	A	G-LC	AM	IBAT, 2019; 2019 surveys

Species Name	Scientific Name	Habitat Category	Red list status (IUCN, 2019; National Red List)	Status	Source
Yellow wagtail	*Motacilla flava*	wG	G-LC	PM	IBAT, 2019; 2019 surveys
Common sandpiper	*Actitis hypoleucos*	PW	G-LC	PM	IBAT, 2019; 2019 surveys
Grey-crowned crane	*Balearica regulorum*	W	G-EN	Resident	IBAT, 2019
Basra reed warbler	*Acrocephalus griseldis*	fw	G-EN	AM	IBAT, 2019

Source: Banage, 1999; Mott MacDonald, 2019. Key: R-VU= Regionally vulnerable; R-NT= Regionally near threatened; R-RR= Regional responsibility; F = Forest generalist; W = Water bird specialist; f = Forest Visitor; G = grassland species; AM = Afro-tropical migrant; PM = Pale-arctic migrants.

The globally Endangered grey-crowned crane inhabits wetlands such as marshes, pans and dams with tall emergent vegetation, riverbanks, open riverine woodland, shallowly flooded plains and temporary pools with adjacent grasslands, open savannas, croplands, pastures, fallow fields and irrigated areas. The species is declining and there are thought to be between 500-8,000 individuals in Uganda. Threats to this species include the loss and degradation of wetland breeding areas. Although this species is listed on CITES Appendix II, illegal captive trade from Uganda is seen to significantly add to the decrease in numbers of grey-crowned crane (BirdLife, 2016).

The globally Endangered Basra reed warbler is a migratory species and passes though Uganda. On migration, it is usually found in low reeds above water, mangroves and gardens. Threats to this species include; habitats loss due to housing and urban development, energy production and mining, fishing and harvesting aquatic resources (BirdLife, 2017a).

The globally Vulnerable papyrus yellow warbler was not listed on the IBAT records within the study area. However, it has a severely fragmented range in the Great Lakes region of Africa. It is found mainly in papyrus-swamps which are present within the KIBP area and occasionally in other marshy habitats. Major threats to this species include loss of its wetland habitat due to drainage for the cultivation of crops, human pressure, owing to an expanding population, and by man-made ecological changes in Lake Victoria itself (BirdLife, 2017b).

The grey-crowned crane and the Basra reed warbler are considered to be of **very high** conservation importance and the papyrus yellow warblers considered to be of **high** conservation importance.

Migratory species

There are two classes of migrants in Uganda: the Afro-tropical migrants and Palearctic migrants. The list of species from IBAT returned one migratory species (the Basra reed warbler described above).

During the 2019 survey, three Afro-tropical migrants were recorded: the African openbill stork *Anastomus lamelligerus*, grey-backed fiscal *Lanius excubitoroides,* woodland kingfisher *Halcyon senegalensis* and two Palearctic migrants: common sandpiper *Actitis hypoleucos*, and yellow wagtail *Motacilla flava*. All of these migrants are globally and nationally Least Concern and none of them are listed under CMS. The KIBP is not considered to support large numbers of these migratory bird species.

These species are considered to be of **medium** conservation importance.

Range-restricted

None of the species recorded in the Scheme area are range-restricted. However, a number of the species are restricted to specific habitat types. Six of the regionally Vulnerable species and three of the Regional Responsibility birds listed in Table 6.8 are water birds, normally found in wetlands or open water. Two of the regionally Vulnerable species and one of the Regional Responsibility species is associated with forest habitats and one regionally Vulnerable species is associated with both wetland and forest. The greatest threat to most of the species mentioned above is due to loss of habitat.

These species are considered to be of **medium** conservation importance.

6.4.4.3 Mammals

The list of species received from IBAT included 153 mammal species within 2km of the Scheme area. Of these species, four are considered globally Vulnerable, six are Near Threatened, 137 are of Least Concern and six are Data Deficient (IUCN, 2019). The full list of globally threatened species recorded within the study area are presented in Appendix 6.7. None of the globally threatened species highlighted in this list were observed during the surveys conducted in 2019. Following consultation with the local ecologist, none of the four globally threatened species have a likelihood of occurring within the KIBP in its current state.

The surveys carried out in 1999, recorded a total of 49 rodents and four shrews (Banage, 1999). None of the mammals were observed during the survey in 2008. However, information provided by the local communities surrounding the KIBP included sightings of wild pigs *Suidae* sp., bushbuck *Tragelaphus scriptus*, mongoose *Herpestidae* sp, cane-rats *Thryonomys swinderianus* and civets *Civettictis civetta*, all of which are globally and nationally Least Concern.

During the survey in 2019, three mammal (rodent) species were recorded within the KIBP via direct observation of the animal or signs (burrows, foraging evidence, droppings, footprints etc). Local farmers in the South C Sector reported six additional mammal species during opportunistic consultations. The methods and results of the mammal survey are presented in Appendix 6.9.

Of the mammals recorded, the sitatunga *Tragelaphus spekii*, reported by a local farming community within KIBP, is listed as nationally Vulnerable in Uganda's National Red List. The sitatunga is an antelope that occurs in tall and dense vegetation of perennial and seasonal swamps, marshy clearings within forests, riverine thickets, and mangrove swamps. In savanna environments, they are typically found in extensive monospecific stands of papyrus *Cyperus papyrus* and the reeds *Phragmites* spp. and *Echinochloa pyramidalis.* Loss of habitat is the main threat to this species. They are vulnerable to long-term changes in water level because it alters vegetation structure, which in turn largely determines their distribution and abundance (IUCN SSC, 2016).

All of the species recorded are listed as globally Least Concern. None of the remaining species are considered to be nationally threatened, migratory or range-restricted.

The sitatunga is considered to be of **high** conservation importance. All other species are considered to be of **low** conservation importance.

6.4.4.4 Amphibians and Reptiles

The list of species received from IBAT included 28 amphibian species and 10 reptile species within 2km of the Scheme area. Of the amphibian species, 27 are Least Concern and one is

Data Deficient (IUCN, 2019). Of the reptile species, all are considered globally Least Concern (IUCN, 2019). None of the species were legally-protected or range-restricted.

The surveys in 1999 recorded a total of 14 amphibian species in the KIBP Scheme area. None of these were considered to be globally or nationally threatened. During the survey in 2019, three species of amphibian and two species of reptile were recorded within KIBP. The methods and results of the survey is presented in Appendix 6.9.

None of the species are considered to be globally or nationally threatened or restricted-range and are common species within the area. They are therefore considered to be of **low** conservation importance.

6.4.4.5 Invertebrates

Terrestrial Invertebrates

The list of species received from IBAT included 224 terrestrial invertebrate records. Of these species there were 16 coleoptera, 195 Odonata, seven orthoptera and six arachnids. There was one globally Vulnerable odonata species; papyrus wisp *Agriocnemis palaeforma* and one Near Threatened species. The remaining species were either Least Concern or Data Deficient.

The papyrus wisp is a damselfly only found in papyrus swamps with clean and flowing water. It was not observed during the 1999 or 2019 surveys and is unlikely to be present within the KIBP site.

In 1999, 38 species of butterflies, belonging to eight families and 28 genera had been recorded in the KIBP site (Banage 1999). The majority of the species recorded belong to the families Nymphalidae (12 species), followed by the Satyridae (five species) and Pieridae (five species). The South A Sector was found to be species rich (26 species) followed by the North Sector (18 species). The South B and C Sectors had five species each. None of the butterflies recorded were identified as globally or nationally threatened (Consult Limited, 2008). No were conducted for terrestrial invertebrates in 2008 or 2019.

Aquatic Invertebrates

The list of species received from IBAT included 23 aquatic invertebrate species. These included three bivalves, 15 Gastropods and five crustaceans. One Critically Endangered species of gastropod was included in the list; *Ceratophallus concavus*. There was one Near Threatened species and the remaining species were Least Concern or Data Deficient. The *Ceratophallus concavus* is possibly Extinct in Uganda. No surveys have been conducted for aquatic invertebrates.

Terrestrial and aquatic invertebrates likely to be present within the KIBP are considered to be of **low** conservation importance.

6.4.4.6 Fish

A total of 56 fish species were returned from the IBAT records within the study area. It is likely that the majority of these species are present in Lake Victoria and some species are likely to be present within Namanve River. The full list of globally threatened species recorded within the study area are presented in Appendix 6.7. Of the 56 species, there was one Sarcopterygii (Least Concern) and 55 Actinopterygii. Of the Actinopterygii, three were globally critically endangered; *Labeo victorianus, Oreochromis esculentus and Oreochromis variabilis*, 51 are of Least Concern and two are considered Data Deficient. No surveys have been conducted for fish within the KIBP.

Fish species that are likely to be present within the KIBP are considered to be of **low** conservation importance.

6.5 Assessment of effects

6.5.1 Introduction

This section presents the identification and assessment of the following potential beneficial and adverse biodiversity impacts of the Scheme during construction and operation.

The Scheme impacts have been addressed separately for each activity (construction and operation) and for each key receptor. An overview of the impacts that will arise during each activity is provided.

Mitigation is presented after impact assessment in Section 6.5.5. A summary of the significant residual effects and the compensation required are also presented in Section 6.5.6.

6.5.2 Construction Impacts

6.5.2.1 Summary of Impacts during Construction

The following impacts for biodiversity have the potential to take place during the construction phase of the Scheme:

- Habitat loss and degradation (permanent and temporary);
- Accidental introduction and dispersal of invasive species;
- Disturbance to terrestrial animal species (e.g. noise, artificial light, vibration, vehicle movement);
- Injury or death of terrestrial animals through habitat clearance;
- Habitat alternation and fragmentation due to encroachment from increased access;
- Increase in road kills and injuries of wildlife;
- Increase in water consumption during construction; and
- Impacts from site activities as follows:
  - Emissions from construction equipment, machinery, and vehicle movement
  - Dust emissions and deposition from land clearing, road works, extraction of material from quarries/borrow pits, material storage, loading/unloading/transportation of materials, wind blowing of stockpiles etc.
  - Topsoil removal and soil compaction from temporary access routes, movements of heavy vehicles and quarries/borrow pits
  - Pollution of soil and water from run-offs, accidental spills, wastewaters, sewage and cleaning of equipment
  - The cleaning of vehicles, machinery and equipment in and near to River Namanve, swamps, streams and wetlands
  - Storage and handling of hazardous materials such as bitumen, lubricants and fluids (e.g. engine oils, grease, brake fluids, etc), fuels, detergents, paints, etc
  - Noise generating activities: construction traffic
  - Presence and visibility of people
  - Artificial lighting
  - Loss of functionally linked habitat (wetlands) within Scheme Site

- Pressure on wildlife posed by a large construction workforce (hunting, poaching, fishing) and
- Construction waste.

6.5.2.2 Assessment of Likely Impacts

Namanve Forest Reserve

Approximately 0.95km^2 of the KIBP overlaps with the boundary of the remaining nationally designated Forest Reserve (see Table 6.6 in Section 6.4.2.1). The dominant habitat within this section of the Forest Reserve is eucalyptus plantation. There are also small sections of swamp habitats dominated by *Phoenix reclinata* and *Cyperus papyrus.* Both of these habitats will be permanently lost. Sections of this area have already been developed or vegetation has been cleared in preparation for construction. The habitats and flora within the Forest Reserve that surrounds the KIBP can potentially be affected by dust deposition, emissions and encroachment due proximity to the habitats and increased access.

Given the high sensitivity of Namanve Forest Reserve, its attributes (swamp) and the impacts described above, the overall effect of construction on the ecological character of the Forest Reserve is considered to be permanent, adverse, moderate and significant.

Habitats

The majority of the habitats within the forest reserve are considered to be modified. The remaining wetland (swamp) habitats are degraded. Approximate habitats loss under the footprint of KIBP is presented in Table 6.7 in section 6.4.3.

The remaining swamp habitat and flora in the KIBP is of medium conservation importance as this habitat type is under threat in Uganda. Site clearance will remove this habitat type from the Scheme Site and an increase in water consumption will reduce the amount of water available and alter the habitat type. This is considered to be an impact of moderate magnitude, with the resulting effect being permanent, adverse, moderate and significant.

The plantation habitat within the KIBP are of low conservation importance as it supports limited biodiversity. Site clearance will remove this habitat type from the KIBP and this is considered to be an impact of moderate magnitude, with the resulting effect being permanent, adverse, minor and not significant.

The River Namanve and Lake Victoria are both of high conservation importance. Impacts associated with the KIBP on the River Namanve include siltation, pollution and dispersal of alien invasive plant species. Impacts on Lake Victoria due to the KIBP include pollution and eutrophication. The removal of wetland habitats between KIBP and Lake Victoria increase the possibility of pollutants running through to Lake Victoria. Construction impacts on these habitats are considered to be of moderate magnitude, with the resulting effect being, adverse, major and significant.

Flora

The majority of species recorded are common in Uganda. However, species of medium conservation importance (rare, threatened, or have environmental and economic value) were also recorded. Site clearance will remove all plant species from the Scheme area and this is considered to be an impact of moderate magnitude, with the resulting effect being permanent, adverse, moderate and significant.

Birds

The habitats within the KIBP have potential to support birds of very high/high (globally/ nationally threatened) and medium (migratory) conservation importance. The Basra reed warbler, grey crowned crane and papyrus yellow warbler are all associated with the swamp habitats within KIBP. The impact of habitat loss, habitat fragmentation disturbance from presence of people, artificial light spill and noise on bird species in the KIBP is considered to be moderate magnitude. The resulting effect is therefore major and significant. For migratory and habitat-restricted birds, considered to be of medium conservation importance, the effect is considered to be temporary, long-term, adverse, moderate and significant.

Mammals

The Sitatunga, which is of high conservation importance as it is nationally Vulnerable, has the potential to be present within KIBP within the plantation and swamp habitats. The other mammals on the Scheme Site are of low conservation importance. The existing and limited habitat on site for this species will be removed during construction and this is considered to be an impact of moderate magnitude. The effect on gazelle is therefore predicted to be permanent, adverse, major and significant, while the effect on the other terrestrial mammals is considered to be permanent, minor and not significant.

Amphibians and Reptiles

Amphibians and reptiles using KIBP are likely to be affected during the construction of the Scheme because of habitats loss and degradation, noise, artificial lighting, presence of people, accidental pollution of water and soil, or hunting/poaching by the construction staff. All these impacts are considered to be of moderate magnitude. The resulting effect of construction on amphibians and reptiles in KIBP is permanent, adverse, minor and not significant for the species likely to be present on site.

Invertebrates

The terrestrial and aquatic invertebrates present within KIBP are considered to be of low conservation importance. The impacts of habitat loss and degradation and accidental injury/ death during construction are considered to be of minor magnitude. The resulting effect of construction on invertebrates in KIBP is temporary, long-term, negligible and not significant.

Fish

The fish likely to be present within KIBP are considered to be of low conservation importance. The impacts of construction pollutions, waste management, accidental introduction and dispersal of alien invasive plant species (which may alter the aquatic habitat), siltation and flooding are considered to be of moderate magnitude. The resulting effect of construction on fish in KIBP is temporary, long-term, minor and not significant.

6.5.3 Operation Impacts

The following impacts for biodiversity have the potential to take place during the operational phase of the Scheme:

- Habitat and flora degradation (e.g. vibration, vehicle movement);
- Habitat alternation and fragmentation due to encroachment from increased access;
- Disturbance to terrestrial animal species (e.g. noise, artificial light, vibration);
- Increase in road kills and injuries of wildlife;

- Flooding due to reduction in wetland and increased siltation;
- Waste pollution;
- Hunting and poaching of wildlife due to improved access roads;
- Accidental introduction and dispersal of invasive species; and
- Site activities including:
  - Increased emissions from vehicle movement;
  - Pollution of soil and water from operational run-offs, accidental spills, wastewaters, sewage and cleaning of equipment;
  - The cleaning of vehicles, machinery and equipment in and near to River Namanve, swamps, streams and wetlands;
  - Noise generating activities: road traffic;
  - Presence and visibility of people;
  - Artificial lighting and
  - Pressure on wildlife posed by increased access into wetlands (hunting, poaching, fishing, vehicle collision).

6.5.3.1 Assessment of Likely Impacts

Namanve Forest Reserve

The habitats and flora within the Forest Reserve that surrounds KIBP can potentially be affected by emissions and encroachment due proximity to the habitats and increased access during operation.

Given the high sensitivity of Namanve Forest Reserve, its attributes (swamp) and the impacts described above, the overall effect of operation on the ecological character of the Forest Reserve is considered to be permanent, long term, adverse, moderate and significant.

Habitats

The swamp habitat surrounding the KIBP including Kayobe swamp, is of medium conservation importance as this habitat type is under threat in Uganda. The impacts of vehicle movement, emissions, and encroachment due to increased access are considered to be of moderate magnitude, with the resulting effect being permanent, adverse, moderate and significant.

The plantation habitats within the KIBP are of low conservation importance as it supports limited biodiversity. Impacts of operation are likely to be of minor magnitude, with the resulting effect being permanent, long-term, adverse, negligible and not significant.

The River Namanve and Lake Victoria are both of high conservation importance. Impacts of the operation of KIBP on River Namanve include siltation, pollution and dispersal of alien invasive species. Impacts on Lake Victoria due to the KIBP include pollution and eutrophication. The removal of wetland habitats during construction between KIBP and Lake Victoria increase the possibility of pollutants running through to Lake Victoria. Operation impacts on these habitats are considered to be of moderate magnitude, with the resulting effect being adverse, major and significant.

Flora

The flora surrounding the KIBP and within Kayobe swamp is of medium conservation importance. The impacts of vehicle movement, encroachment and pollution are considered to

be of moderate magnitude, with the resulting effect being permanent, adverse, moderate and significant.

Birds

The swamp habitats within the KIBP and surrounding wetland habitats have potential to support birds of very high/high (globally threatened) and medium (migratory) conservation importance. The impact of habitat degradation due to operational vehicle movements, disturbance from presence of people, artificial light spill and noise on bird species during operation is considered to be minor magnitude. The resulting effect is therefore moderate and significant. For migratory and habitat-restricted birds, considered to be of medium conservation importance, the effect is considered to be permanent, long-term, adverse, minor and not significant.

Mammals

The sitatunga, which is of high conservation importance as it is nationally Vulnerable, has the potential to be present within KIBP and surrounding habitats. The other mammals in the study area are of low conservation importance. The impacts of operation include habitat degradation, disturbance, increase in hunting/ road kill. These impacts are of minor magnitude. The effect on this gazelle is therefore predicted to be permanent, adverse, moderate and significant, while the effect on the other terrestrial mammals is considered to be permanent, negligible and not significant.

Amphibians and Reptiles

Amphibians and reptiles within the surrounding habitats of KIBP are likely to be affected during the operation of the Scheme because of habitats degradation, noise, artificial lighting, presence of people, accidental pollution of water and soil, or hunting/poaching. All these impacts are considered to be of minor magnitude. The resulting effect of construction on amphibians and reptiles is permanent, adverse, negligible and not significant for the species likely to be present in the area.

Invertebrates

The terrestrial and aquatic invertebrates present within KIBP are considered to be of low conservation importance. The impacts of habitat degradation and accidental injury/ death during operation are considered to be of minor magnitude. The resulting effect of operation on invertebrates is permanent, long-term, negligible and not significant.

Fish

The fish likely to be present within KIBP are considered to be of low conservation importance. The impacts of operation pollutions, waste management, accidental introduction and dispersal of alien invasive species, siltation and flooding are considered to be of moderate magnitude. The resulting effect of operation on fish in KIBP is permanent, long-term, minor and not significant.

6.5.4 Summary of Construction and Operation Impacts

A summary of the potential impacts on biodiversity are shown in Table 6.9. Those that are moderate or major are considered significant. This table does not include secondary impacts covered in other sections.

Table 6.9: Summary of significance assessment of potential impacts, pre-mitigation

Receptor	Summary of impact	Permanent/ Temporary	Adverse/ Beneficial	Magnitude of Impact	Sensitivity of Receptor	Effect Evaluation	Significance of Effect
Construction Phase							
Forest Reserve	Habitat loss of approximately 0.95km^2 within the Forest Reserve. Habitat degradation within 500m of the Scheme site Spread of Alien Invasive Species	Permanent	Adverse	Moderate	High	Major	Significant
Lake Victoria	Pollution from effluents Spread of Alien Invasive Species Increase in water consumption	Temporary	Adverse	Moderate	High	Major	Significant
River Namanve	Pollution from effluents Siltation and increased risk of flooding Spread of Alien Invasive Species	Temporary	Adverse	Moderate	High	Major	Significant
Wetland habitats (swamps)	Habitat loss and degradation Pollution from effluents Habitat fragmentation Spread of Alien Invasive Species Increase in water consumption	Permanent	Adverse	Moderate	Medium	Moderate	Significant
Plantation	Habitat loss and degradation Pollution from effluents	Permanent	Adverse	Moderate	Low	Minor	Not significant
Flora (Medium)	Loss of native swamp species	Permanent	Adverse	Moderate	Medium	Moderate	Significant
Birds (High)	Habitat and flora loss and degradation Disturbance from human activities (e.g. noise, artificial light, vibration, vehicle movement) Hunting and poaching of wildlife due to improved access roads	Permanent	Adverse	Moderate	High	Major	Significant
Birds (Medium)	Habitat and flora loss and degradation Disturbance from human activities (e.g. noise, artificial light, vibration, vehicle movement) Hunting and poaching of wildlife due to improved access roads	Permanent	Adverse	Moderate	Medium	Moderate	Significant

Receptor	Summary of impact	Permanent/ Temporary	Adverse/ Beneficial	Magnitude of Impact	Sensitivity of Receptor	Effect Evaluation	Significance of Effect
Mammals (High)	Habitat loss and degradation Disturbance from human activities (e.g. noise, artificial light, vibration, vehicle movement) Injury or death Increase in road kills and injuries Hunting and poaching of wildlife due to improved access roads	Permanent	Adverse	Moderate	High	Major	Significant
Mammals (Low)	Habitat loss and degradation Disturbance from human activities (e.g. noise, artificial light, vibration, vehicle movement) Injury or death Increase in road kills and injuries Hunting and poaching of wildlife due to improved access roads	Permanent	Adverse	Moderate	Low	Minor	Not significant
Amphibians and reptiles (Low)	Habitat loss and degradation Disturbance from human activities (e.g. noise, artificial light, vibration, vehicle movement) Injury or death Increase in road kills and injuries	Permanent	Adverse	Moderate	Low	Minor	Not significant
Invertebrates (Low)	Habitat loss and degradation Injury or death	Permanent	Adverse	Moderate	Low	Minor	Not significant
Fish (Low)	Pollution from effluents Siltation and increased risk of flooding Spread of Alien Invasive Species	Permanent	Adverse	Moderate	Low	Minor	Not significant
Operational Phase							
Forest Reserve	Habitat degradation within 500m of the Scheme site Spread of Alien Invasive Species	Permanent	Adverse	Minor	High	Moderate	Significant
Lake Victoria	Pollution from effluents Spread of Alien Invasive Species	Permanent	Adverse	Moderate	High	Major	Significant
River Namanve	Pollution from effluents Siltation and increased risk of flooding	Permanent	Adverse	Moderate	High	Major	Significant

Receptor	Summary of impact	Permanent/ Temporary	Adverse/ Beneficial	Magnitude of Impact	Sensitivity of Receptor	Effect Evaluation	Significance of Effect
	Spread of Alien Invasive Species						
Wetland habitats (swamps)	Habitat degradation Pollution from effluents Habitat fragmentation Spread of Alien Invasive Species	Permanent	Adverse	Moderate	Medium	Moderate	Significant
Plantation	Habitat degradation Pollution from effluents	Permanent	Adverse	Minor	Low	Negligible	Not significant
Birds (High)	Habitat degradation Disturbance from human activities (e.g. noise, artificial light, vibration, vehicle movement) Hunting and poaching of wildlife due to improved access roads	Permanent	Adverse	Minor	High	Moderate	Significant
Birds (Medium)	Habitat degradation Disturbance from human activities (e.g. noise, artificial light, vibration, vehicle movement) Hunting and poaching of wildlife due to improved access roads	Permanent	Adverse	Minor	Medium	Minor	Not significant
Mammals (High)	Habitat degradation Disturbance from human activities (e.g. noise, artificial light, vibration, vehicle movement) Injury or death Increase in road kills and injuries Hunting and poaching of wildlife due to improved access roads	Permanent	Adverse	Minor	High	Moderate	Significant
Mammals (Low)	Habitat degradation Disturbance from human activities (e.g. noise, artificial light, vibration, vehicle movement) Injury or death Increase in road kills and injuries Hunting and poaching of wildlife due to improved access roads	Permanent	Adverse	Minor	Low	Negligible	Not significant
Amphibians and reptiles (Low)	Habitat degradation	Permanent	Adverse	Minor	Low	Negligible	Not significant

Receptor	Summary of impact	Permanent/ Temporary	Adverse/ Beneficial	Magnitude of Impact	Sensitivity of Receptor	Effect Evaluation	Significance of Effect
	Disturbance from human activities (e.g. noise, artificial light, vibration, vehicle movement) Injury or death Increase in road kills and injuries						
Invertebrates (Low)	Habitat degradation	Permanent	Adverse	Minor	Low	Negligible	Not significant
Fish (Low)	Pollution from effluents Siltation and increased risk of flooding	Permanent	Adverse	Minor	Low	Negligible	Not significant

6.5.5 Mitigation Measures

Table 6.10 provides a summary of mitigation and enhancement measures for impacts identified in this section. They are discussed in more detail in the following sub-sections.

Table 6.10: Mitigation and enhancement measures

Type of measure	Detail
Biodiversity - Generic Construction Mitigation	Minimisation: Control the accidental release of pollutants and potentially contaminated sediments Specific measures for pollution prevention to be implemented include: • No refuelling facility of construction vehicles to be provided on site • Ensuring all toxic, hazardous and harmful materials, chemicals and the fuel are stored in bunded areas with impervious bases and soak pits to contain accidental spills • Minimising the stored quantities of diesel, oil, paints, thinner or other chemicals that pose environmental hazards and fit all drums and barrels with flow control taps and ensure proper labelling • Implementing fuel/chemical spill prevention procedures on the site and proper contingency planning, including availability of spill clean-up materials and • Ensuring emergency response procedures are in place and the construction site staff is adequately trained in spill prevention and clean up procedures. Spill kits and similar equipment will be provided on site. Minimisation: Control dust levels during construction Level of dust will be reduced during construction by implementing the following measures: • The construction sites will be fully fenced to serve as a wind barrier and for security purposes • All soil that clings to the wheels of the trucks will be removed via spray of water before exiting the site • All hauling trucks for excavated soil into an approved disposal site must be fully covered to prevent any soil/dust blown during transit from the site • Ensure there is an adequate water supply available for dust suppression • Stockpiles will be suitably covered within the site to prevent any wind event to blow dust and soil • Site internal roads will be kept regularly damped down during the dry season, compacted or suitably surfaced to minimise dust emissions from vehicle use and • Speed limits up to 20kph will be implemented throughout the site and site traffic will be minimised as practicable via security officers at the exit and entrance points. • As the internal roads will be paved (in accordance with BS594987). Dust deposition is likely to be minimal during operation. Avoidance: Avoid loss or degradation of wetland swamp habitat • The locations and footprints of the works will be chosen to avoid the wetland habitats. As previously agreed between NEMA and UIA, the wetland habitats within in the KIBP will be demarcated off and conserved for ecological purposes. No construction activities will take place within wetland habitats e.g. vehicle access, equipment storage etc. • UIA will collaborate with WMD to identify areas that can be retained and enhanced as wetland habitat within the KIBP. • UIA will collaborate with the National Forestry Authority to produce a management plan for the remaining areas of the Forest Reserve to protect and enhance the remaining wetland swamp habitats. • No additional construction activities will take place in the Forest Reserve beyond the existing master plan.. Where construction within the Forest Reserve has started, suitable wetland habitat restoration will occur offsite as part of the Biodiversity Action Plan (see below). • A 30m vegetated buffer on either side of River Namanve will be put in place (in accordance with The National Environment (Wetlands, River Banks And Lake Shores Management) Regulations, No. 3/2000) to avoid siltation and risk of flooding. The vegetation will be planted within the buffer and will be native wetland (swamp) species. • The drainage masterplan will be designed and implemented prior to the start of new developments to ensure all waste is properly treated during construction and operation the KIBP. • Vehicle movements will be monitored to avoid creating off-road tracks off-road vehicle movements are one of the main causes of habitat degradation in arid areas. Measures to prevent and control dust and soil/water pollution will be also implemented (see above). Minimisation: Translocate wetland plants

Type of measure	Detail
	• Additional surveys are to be undertaken prior to any clearance works to establish the baseline flora data within the KIBP and identify plants of conservation concern to be translocated. • During the clearance works, swamp areas are to be protected and the wetland plants will be excavated and used to create wetland habitats off-site. The new swamp habitats will have both effluent treatment and biodiversity functions.
Biodiversity Action Plan	• Detailed biodiversity surveys will be conducted within KIBP and within 500m of the Scheme footprint prior to any vegetation clearance to inform mitigation and biodiversity offsetting.. • Targeted surveys will be conducted for the grey-crowned crane, Basra reed warbler, papyrus yellow warbler and sitatunga which are globally and nationally threatened. • Surveys to identify areas infested with AIS will be carried out and mapped. • The BAP will include a monitoring programme for biodiversity during construction and annually for the first three years of operation. • Off-site wetland habitat restoration (papyrus swamp) will be included in the BAP (see translocate wetland plants above). • Adaptive management will be incorporated where impacts on habitats, flora and fauna are significant (the BAP will define significance following baseline data collection).
Mitigation applicable to terrestrial wildlife (birds, mammals, amphibians and reptiles)	Minimisation: Minimise period excavations are left open, fence off and/or cover open excavations when not working, undertake periodic checks of excavations to remove any entrapped animals • Deep excavations will be covered or fenced off to prevent the access of wildlife and people while not working (including at night). Twice weekly checks of open trenches and other excavations will be undertaken to identify any entrapped mammals. • Rescue of any entrapped animals will be undertaken with extra care to minimise animal stress and the risk of injury. For trenches that will need to be left open for a considerable time, install slopes or other escape measures for small animals at places that are not fenced of (where possible). This may reduce the need for twice weekly monitoring and therefore personnel costs considerably. Minimisation: Capture and translocation of animals from the KIBP site • Any mammals (including threatened species such as the sitatunga), amphibians and reptiles seen on site before or during construction will be allowed to leave the site or will be captured and translocated to a site supporting suitable habitats for those species. Studies in the receptor site are necessary to avoid translocating animals to a site which is at or above carrying capacity. The selection of appropriate receptor sites will be established in consultation with the relevant statutory bodies and national/local experts. Appropriate measures will be put in place to maintain animal welfare and minimise stress. • It is important to note that species translocation can be time consuming and expensive and will be used in conjunction with other forms of mitigation. Any translocation will follow the IUCN guidelines on effective translocation and reintroduction programmes (Gardner and Howarth, 2009). Minimisation: Implement noise reduction measures and avoid/reduce artificial lighting to reduce impacts on birds and mammals during construction • Measures will be implemented across the works areas to reduce noise levels and disturbance to birds and other sensitive ecological receptors (See Section 11.4.5) • Artificial lighting used on construction sites and camps will be shaded and directed downwards to avoid light spillage and disturbance to birds and other wildlife. Minimisation: Implementation of hunting ban by construction staff to reduce pressure on species • All construction staff will be required to follow company rules and code of conduct. Signage will be installed illustrating the hunting ban on any wild species throughout the works areas. The main contractors' EHS Managers will be responsible for implementing the enforcement of bans (on hunting, fishing, keeping animals on site and feeding animals on site) and raising awareness about the importance of the wetland and threatened species. Any staff member breaching the hunting ban will be subject to disciplinary action. Avoidance: Design and schedule construction and vehicle movements to avoid or minimise bird injury/deaths and disturbance • This measure applies to the removal of the swamp and plantation habitats. Any vegetation clearance will be undertaken outside the breeding season. The main bird breeding season in the study area is considered to be April and June. However, breeding may occur earlier or later for individual species. Minimisation: Undertake a check for nesting birds before vegetation clearance (within 48 hours)

Type of measure	Detail
	• This action is only relevant where vegetation clearance activities cannot be avoided during the breeding season; main bird breeding season in the Scheme area is April to June. A check for nesting birds by a qualified ecologist will be undertaken within 48 hours of vegetation clearance. If breeding birds are discovered, then works will be postponed in that area until the breeding cycle is complete (this may take up to three weeks). A species-specific buffer zone (minimum 25 m) will be set up around the nest site following consultation with a qualified ecologist.
Biodiversity – prevention and minimisation of alien invasive species	Minimisation: Prevent the spread of non-native alien invasive species • The likelihood of invasions by alien species is higher in habitats that are altered and disturbed. There are three alien invasive species present within the KIBP; *Mimosa pigra, Broussonetia papyrifera* and *Lantana camara.* • Preventative, control and monitoring measures will need to be implemented with regard to the following aspects of the Scheme: – Packaging and movement of materials – Minimise traffic and the distance it has travelled; – Source goods/materials locally where possible; and – Contain any alien invasive species and report their presence. • Vehicles and plant – 'As-new' wash-down is essential before entering non-infested areas of the site and after working in infested areas; – Train and raise awareness regarding alien invasive species; – Pressure wash vehicle tyres in a contained area; – Contain and destroy residue; and – Record and report the presence of any alien invasive species. • Soil and vegetation – Minimise disturbance to, or movement of, soil and vegetation; – Prevent soil damage and erosion; – Ensure imported soil/other materials are safe and free of alien invasive species (source from a reputable supplier, request information on the soil's origin and certification of alien invasive species-free status if possible); – Prevent alien invasive species establishment on exposed stored soil (do not store bare soil near known sources of alien invasive species, consider using matting to cover exposed soil); – Ensure infested material is disposed of safely; and – Retain as much natural vegetation as possible. • Habitat reclamation – Use native plants for reinstatement and landscaping; – Assess any non-native species (to be used in landscaping) for alien invasive species potential; – Consider that some alien invasive species may be soil-based; and – Avoid altering soil and water body properties.
Invasive species management plan	Where possible implement a plan to remove *Mimosa pigra, Broussonetia papyrifera* and *Lantana camara* from the KIBP. Some components of an integrated management approach are introduced below for these established invasive species: • Control is generally best applied to the least infested areas before dense infestations are tackled. Consistent follow-up work is required for sustainable management. • For large infestations of *Mimosa pigra,* an integrated approach involving mechanical removal, herbicide application, fire and pasture management can be adopted. Mechanical control can be effective as long as the plants are cut 10 cm or more below ground level. Cutting at ground level will usually result in resprouting. Various chemicals can be used to control *Mimosa pigra* using a variety of methods -foliar sprays, basal bark applications methods (painting herbicide onto the bark), soil application and cut stump applications. When using any herbicide always read the label first and follow all instructions and safety requirements. If in doubt consult an expert. Fire can be used as a management tool, but usually in combination with other methods such as chaining. Fire alone may actually increase densities of *Mimosa pigra* by plant regrowth and enhanced seed germination. However, all mechanical and chemical management does not prevent the germination of many seeds in the seedbank which can persist for several seasons/years. • Small *Broussonetia papyrifera* plants can be uprooted but it is important to remove the roots completely as it reproduces vegetatively from the roots. Large trees can be cut and herbicide applied to the cut stump. If herbicide is not applied then the plant will coppice profusely. If cut close to the ground without applying herbicide, the root system will send out multiple coppices which grow quickly from the existing root system.

Type of measure	Detail
	• Ring barking can work for *Broussonetia papyrifera* if it is done close to ground level but not if the trees have extensive buttresses. Frilling (making deep cuts at regular intervals around the base of the tree and applying herbicide into the cuts) has been very extremely effective. However, control of large infestations of mature trees is very labour-intensive. • Work done in Mabira and Budongo forests in Uganda has been shown that when the forest is not heavily degraded and has enough natural forest tree species in the seed bank, the best way to control *Broussonetia papyrifera* is either to leave the forest undisturbed or add more seedlings of emergent tree seedlings/ saplings in carefully opened small gaps to encourage the closing up of the forest thereby eliminating it as it is harder to regenerate in a shaded environment. • Attempts to control *Lantana camara* using large grazers are detrimental. Few large browsers are entirely freed from the plants ability to cause ulcers and other lesions, especially around and in their mouths. Mechanical control can be effective but there must be continuous follow-up as stem and roots freely coppice. Burning can encourage *Lantana camara* regeneration. Chemical control is cheaper and causes less disturbance resulting in higher biodiversity than mechanical control. When using any herbicide always read the label first and follow all instructions and safety requirements or consult with an expert.

6.5.6 Residual Effects

Residual effects are those that remain after mitigation and/or enhancement measures have been implemented. A summary of residual effects for biodiversity is presented in Table 6.11.

Table 6.11: Residual effects for biodiversity after the application of mitigation

Receptor	Summary of impact	Permanent / Temporary	Adverse/ Beneficial	Impact Magnitude	Sensitivity of Receptor	Effect Evaluation	Significance of Effect
Construction Phase							
Forest Reserve	Habitat loss of approximately 0.95km^2 within the Forest Reserve. Habitat degradation within 500m of the Scheme site Spread of Alien Invasive Species	Permanent	Adverse	Minor	High	Moderate	Significant
Lake Victoria	Pollution from effluents Spread of Alien Invasive Species	Temporary	Adverse	Minor	High	Moderate	Significant
River Namanve	Pollution from effluents Siltation and increased risk of flooding Spread of Alien Invasive Species	Temporary	Adverse	Minor	High	Moderate	Significant
Wetland habitats (swamps)	Habitat loss and degradation Pollution from effluents Habitat fragmentation Spread of Alien Invasive Species Increase in water consumption	Permanent	Adverse	Minor	Medium	Minor	Not significant
Plantation	Habitat loss and degradation Pollution from effluents	Permanent	Adverse	Minor	Low	Negligible	Not significant
Flora (Medium)	Loss of native swamp species	Permanent	Adverse	Minor	Medium	Minor	Not significant
Birds (High)	Habitat and flora loss and degradation Disturbance from human activities (e.g. noise, artificial light, vibration, vehicle movement) Hunting and poaching of wildlife due to improved access roads	Permanent	Adverse	Minor	High	Moderate	Significant
Birds (Medium)	Habitat and flora loss and degradation Disturbance from human activities (e.g. noise, artificial light, vibration, vehicle movement) Hunting and poaching of wildlife due to improved access roads	Permanent	Adverse	Minor	Medium	Minor	Not significant
Mammals (High)	Habitat loss and degradation Disturbance from human activities (e.g. noise, artificial light, vibration, vehicle movement) Injury or death Increase in road kills and injuries Hunting and poaching of wildlife due to improved access roads	Permanent	Adverse	Minor	High	Moderate	Significant

Receptor	Summary of impact	Permanent / Temporary	Adverse/ Beneficial	Impact Magnitude	Sensitivity of Receptor	Effect Evaluation	Significance of Effect
Mammals (Low)	Habitat loss and degradation Disturbance from human activities (e.g. noise, artificial light, vibration, vehicle movement) Injury or death Increase in road kills and injuries Hunting and poaching of wildlife due to improved access roads	Permanent	Adverse	Minor	Low	Negligible	Not significant
Amphibians and reptiles (Low)	Habitat loss and degradation Disturbance from human activities (e.g. noise, artificial light, vibration, vehicle movement) Injury or death Increase in road kills and injuries	Permanent	Adverse	Minor	Low	Negligible	Not significant
Invertebrates (Low)	Habitat loss and degradation Injury or death	Permanent	Adverse	Minor	Low	Negligible	Not significant
Fish (Low)	Pollution from effluents Siltation and increased risk of flooding Spread of Alien Invasive Species	Permanent	Adverse	Minor	Low	Negligible	Not significant
Operational Phase							
Forest Reserve	Habitat degradation within 500m of the Scheme site Spread of Alien Invasive Species	Permanent	Adverse	Minor	High	Moderate	Significant
Lake Victoria	Pollution from effluents Spread of Alien Invasive Species	Permanent	Adverse	Minor	High	Moderate	Significant
River Namanve	Pollution from effluents Siltation and increased risk of flooding Spread of Alien Invasive Species	Permanent	Adverse	Minor	High	Moderate	Significant
Wetland habitats (swamps)	Habitat degradation Pollution from effluents Habitat fragmentation Spread of Alien Invasive Species	Permanent	Adverse	Minor	Medium	Minor	Not significant
Plantation	Habitat degradation Pollution from effluents	Permanent	Adverse	Minor	Low	Negligible	Not significant
Birds (High)	Habitat degradation Disturbance from human activities (e.g. noise, artificial light, vibration, vehicle movement) Hunting and poaching of wildlife due to improved access roads	Permanent	Adverse	Minor	High	Moderate	Significant

Receptor	Summary of impact	Permanent / Temporary	Adverse/ Beneficial	Impact Magnitude	Sensitivity of Receptor	Effect Evaluation	Significance of Effect
Birds (Medium)	Habitat degradation Disturbance from human activities (e.g. noise, artificial light, vibration, vehicle movement) Hunting and poaching of wildlife due to improved access roads	Permanent	Adverse	Minor	Medium	Minor	Not significant
Mammals (High)	Habitat degradation Disturbance from human activities (e.g. noise, artificial light, vibration, vehicle movement) Injury or death Increase in road kills and injuries Hunting and poaching of wildlife due to improved access roads	Permanent	Adverse	Minor	High	Moderate	Significant
Mammals (Low)	Habitat degradation Disturbance from human activities (e.g. noise, artificial light, vibration, vehicle movement) Injury or death Increase in road kills and injuries Hunting and poaching of wildlife due to improved access roads	Permanent	Adverse	Minor	Low	Negligible	Not significant
Amphibians and reptiles (Low)	Habitat degradation Disturbance from human activities (e.g. noise, artificial light, vibration, vehicle movement) Injury or death Increase in road kills and injuries	Permanent	Adverse	Minor	Low	Negligible	Not significant
Invertebrates (Low)	Habitat degradation	Permanent	Adverse	Minor	Low	Negligible	Not significant
Fish (Low)	Pollution from effluents Siltation and increased risk of flooding	Permanent	Adverse	Minor	Low	Negligible	Not significant

Some construction and operation activities have the potential for significant adverse impacts on sensitive biodiversity receptors, even after the implementation of suitable mitigation measures. This is due to the long-term impacts of KIBP on the wetland habitats and the bird and mammal species present within the area. Residual impacts on River Namanve during construction and operation include changes in flow and aquatic flora and fauna due to storm water directed into the river.

Residual impacts on terrestrial fauna include habitat loss and hunting/ poaching of wildlife in the areas due to increased access and improved roads.

7. Geology and Soils

7.1 Introduction

7.1.1 Overview

This chapter considers the potential effects on the geology and soils underlying the KIBP area as a result of impacts arising from the construction and operation of the infrastructure associated with the KIBP, in accordance with Equator Principles and IFC guidelines as well as Ugandan national standards.

This assessment describes the methodology used to assess baseline geological conditions, identifies the Area of Influence, its baseline and the sensitive receptors within it, and presents an assessment of the potential impacts to identify where significant effects are expected to arise.

7.1.2 Study Area and Area of Influence

The Area of Influence with regards to geology and soils is the area that could potentially be affected by ground pollution during the construction and operational phases. For the purposes of this assessment, this comprises:

- The development area within the scheme boundary, as presented in Figure 2.3;
- Any borrow pit areas to be used for the scheme; and
- Construction compounds and associated storage areas.

7.2 Methodology

The information presented in this chapter has been obtained through desk-based research and a site walkover to clarify the environmental setting, including current land uses, presence and location of any significant sources of contamination, presence of hazardous materials, and any visible signs of contamination including stained soil or hardstanding and noticeable odours.

7.2.1 Applicable Guidelines and Standards

It is understood that NEMA is in the process of developing soil pollution standards and at the time of the study, draft standards were unavailable. In the absence of existing Ugandan standards, this assessment has considered UK, USEPA and Dutch generic soil screening values for analysis results. The values relate to the protection of human health in a commercial land use and are widely used as being indicative of international standards.

Guidance is also provided by the IFC's General Environmental, Health and Safety Guidelines, which has a specific section for management of Contaminated Land.

7.2.2 Field Surveys

A site visit was made on 26-28 March 2019, comprising personnel from Q&L, Mott MacDonald, Lagan-Dott JV, and a representative from the UIA. The representative from the UIA confirmed that areas of ground contamination have been identified on the KIBP site since commencement of industrial operations, largely comprising minor oil spills and contamination associated with insufficiently treated effluent discharge, particularly along the Namanve River where the culverts are located. It was also confirmed that illegal sand mining operations were also occurring on particular areas of the site; this was particularly observed in parts of the North Sector.

Limited soil sampling was also undertaken by Q&L, with samples collected from five locations around the study area and submitted for high-level soil analysis; results are provided under Section 7.3.3.1.

7.2.3 Determining Magnitude, Sensitivity, and Impact Significance

Please see the following sections of the main ESIA report:

- Section 4.8.1 - Magnitude Criteria
- Section 4.8.2 - Sensitivity Criteria
- Section 4.8.3 - Evaluation of Effects

7.2.4 Limitations and Assumptions

The assessment is primarily based on existing documentation (such as desk studies, historical mapping, geological mapping and existing ground investigation reports or borehole logs). Please also see the following sections of the main ESIA report:

- Section 4.11 - Uncertainty

7.3 Baseline

The following information is based largely on the 2002 and 2008 ESIAs; it is considered that baseline ground conditions have remained relatively unchanged since this time and therefore this information is still valid for the purposes of this ESIA.

7.3.1 Geology

The proposed Scheme site is part of the narrow, down-warped northern catchment of Lake Victoria. It is underlain by granitoid schistose rocks of the Basement Complex (Pallister, 1959). These are deeply weathered and generally not exposed at the surface. The hills rise only about 110m above Lake level and are rounded and capped with laterite soil. The highest, point Nantabulirwa hill, rises to over 1,350m above sea level while Bbuto hill is over 1,316.6m above sea level (Pallister, 1959). The hills rise abruptly from a series of aggradation slopes, apparently the result of old Lake terraces, from which clay for brick making and sand are currently being extracted. The lithology is poorly exposed and overlain by thick deposits of clay and clayey gravel. The underlying rocks comprise undifferentiated granitoid gneiss with some later granite including the migmatised Buganda Series. These all belong to the Basement Complex of the Precambrian era. A small section of the Scheme site (part of South 'C2'), is overlain by inter-fingering deposits belonging to the Cainozoic era. These include Holocene swamp, alluvium and lacustrine deposits (after Geological survey of Uganda – Kampala, Sheet N. A. 36 – 14. Scale 1: 250,000, 1962).

7.3.2 Seismicity

Previous studies reported in the M/S GIBB Environmental Impact Study[8] reported no major fault lines within the Scheme site. However, Kampala and its environs, where the Scheme site is located, are subjected to seismic activity, and the area is classified as Zone V as defined in the modified Mercalli Scale (after UNIDO/UNCTAD 1998[9]; intensity ratings are expressed as Roman numerals between I at the low end and XII at the high end.)

7.3.3 Soils

Soils in the Namanve area fall within the Buganda Quatemary complex. There are various soil types that fall within this category, ranging from shallow murrum-based litosols on the ridges, through deep, reddish and free-draining hillside latosols with termitaria, through heavy, brown to grey and black clay loams and finally to sticky valley clays (Banage 1999).

[8] GIBB 2002. Environmental Assessment Study of Namanve Industrial and Business Park. Final report for the Uganda Investment Authority (Unpublished report).

[9] UNIDO and UNCTAD 1998. Pre-feasibility study and preliminary design proposal for Namanve Industrial Park. Final report for the Uganda Investment Authority (Unpublished report).

Two main types of soil occur in the Scheme area. The first belongs to the Buganda Series and comprises red loams or clay-loams and has a high productivity rating. Further south the soils belong to the Kabira and Katera Series which comprise yellow red foams and strong brown loamy sands which have an agricultural productivity rating that varies from medium to low - nil (Kampala Soils Map, 1:250 000 1961). More specifically, two types of clay material have been identified in the Namanve area:

- Alluvial or transported clays - grey plastic clays which appear to be typical swamp clay deposits; and
- Sedentary type clays - these are mottled, grey-yellowish, brown sandy clays formed in situ by the weathering of the Precambrian granittorid-gneiss and granites. These normally underlie the alluvial clays and are common towards the middle reaches of the gentle lopes of the broad valleys.

Coarse, medium and fined grained sands and gravels can be observed in the upper reaches of the broad topographical low (closer to the swamps). The deposits of these sands (coarse, medium and fine-grained) and gravel have been both legally and illegally exploited since the 1970s; this was in part of the North Sector at the time of the site walkover.

A small portion of the Scheme site in the south-eastern corner of Sector South C is covered by lateritic soils which are about 1 to 2m thick and overlie quartztic gneiss. The remaining area along the eastern boundary between the lateritic soils in the south and the red sands to the north is covered by 40 cm of thick black sandy loams with over 35cm of conglomerate which in turn over-lie gravely white.

With the exposure of the soils after excavation, drying out takes place and this results in oxidation, possibly leading to increased acidity of the soils.

7.3.3.1 Soil Sampling Results

A total of five soil samples were collected using hand augers after removal of a layer of the top soil. The soil samples were collected at a depth of approximately 30cm below ground level.

The samples were collected from five locations, as described in the Table 7.1 and shown in Appendix 7.1.

Table 7.1: Soil Sampling Locations

Sample code	Sampling Point	Northing	Easting
1	Solid Waste Treatment Plant	37750	464742
2	Waste Water Treatment Plant	37325	465244
3	Sewer Line / Water Main (South B)	38453	464978
4	Road junction / Railway siding (South C)	37920	467012
7	Sewer Line / Water Main (North)	40150	464760

These locations were selected as giving indicative baseline results for areas anticipated to be disturbed during the proposed works. The intention was not to provide a detailed geotechnical or contamination assessment, but more to provide a high-level indication of soil quality on site to determine if further assessment may be required.

During construction and operation phases there is the potential for a wide range of contaminants to be encountered at the areas where soil samples have been collected. The samples have been analysed for BTEX (benzene, toluene, ethylbenzene and xylene) and heavy metals content on the following basis:

- Spills and leaks of petroleum products such as gasoline, diesel fuel and lubricating and heating/ boiler fuel oil are common sources of BTEX-contamination in soils. Due to their polarity and very soluble characteristics, organic chemicals (BTEX) of petroleum products will be able to enter and contaminate soil, therefore it is useful to establish and document baseline levels for BTEX.
- Heavy metal contamination is expected to be mainly an operation-phase issue, especially at waste treatment and disposal sites; it is anticipated that solid waste or effluents may include waste from industries such as

those producing lead batteries (e.g. Uganda Batteries LTD which is already operational in KIBP), metal processing industries (iron-steel works), etc.

Furthermore, as these categories of pollutants are persistent in soil and (ground)water, their presence could also signal the presence of a wider range of other pollutants during monitoring.

Following collection, the air-dried soil samples were pounded, sieved through 2mm sieve and debris subjected to physical-chemical analysis (following standard methods described by Okalebo et al.) for BTEX and heavy metals. Heavy metals analysed included Zinc, Chromium and Lead. These were analysed using Agilent 280FS Atomic Absorption Spectrometer.

Results of the Laboratory analysis for the soil samples are presented in the table below.

Table 7.2: Soil Analysis Results

Sample code	Sampling Point	Zinc (mg/kg)	Lead (mg/kg)	Chromium (mg/kg)
1	Solid Waste Treatment Plant	10.94	21.13	36.82
2	Waste Water Treatment Plant	5.45	21.07	9.40
3	Sewer Line / Water Main (South B)	3.73	14.37	28.36
4	Road junction / Railway siding (South C)	4.74	2.00	<0.001
7	Sewer Line / Water Main (North)	4.5	17.94	17.84
UK generic soil screening value (commercial land use)	N/A	730,000	1330	49 (Cr VI) or 8000 (Cr III)
Dutch values	N/A	720	530	No value
USEPA		350000	800	6 (CrVI) or 1800000 Cr III)

Source: Queensland & Leeds, 2019

Based on the results presented in the table above, the soils tested appear to contain very low levels of the limited suite of metals for which analysis was performed.

Furthermore, the BTEX analysis results identified that all 5 samples had levels that were below the limit of detection, and therefore the soils could be considered to be free from BTEX compounds.

7.4 Assessment of Effects

7.4.1 Introduction

This section presents the assessment of the effects on the geology and soils on site due to the potential impacts that are expected to arise during the construction and operation phases of the Scheme.

Key receptors which are anticipated to be sensitive to changes in the existing geological and soils conditions on site are considered to include:

- Human health (these may include: construction workers; residents; commercial workers and industrial workers);
- Controlled waters (surface waters - principally the Namanve River and groundwaters) (note that impacts on hydrology and hydrogeology are principally assessed within Chapter 15 of this ESIA);
- Built environment (buildings and property); and
- Ecological receptors.

Construction

As described in Section 4.5, construction of the Scheme requires extensive groundworks, such as for site clearance and topsoil removal, foundations, drainage, and installation of buried services. There is also the potential for borrow pits to be used for sourcing of fill materials, although the exact location of these is to be confirmed.

The potential for erosion increases with site clearance, borrow pit use, and increased runoff from hardstanding (such as roads), and soil compaction can take place with the development of both temporary and permanent roads. The introduction of construction materials and processes can increase the risk of pollution and contamination due to use of accidental release of contaminative resources or from accidental leaks and spills of hydrocarbons from machinery used on site.

Beyond the site, increased suspended materials in waterways and increased deposition can take place as a result of erosion and run-off from site without implementation of suitable management practices.

Operation

Ongoing operation of the Scheme is not anticipated to result in significant earthworks; only minor excavation associated with maintenance of buried services is anticipated, and these works are not considered to have the potential to result in significant effects on ground conditions. Implementation of an operational ESMP would ensure appropriate mitigation is in place for these works.

As part of the ESIA scoping report (see Appendix 4.1), it was noted that there could be a minor risk of land contamination due to operation of infrastructure, predominantly relating to the solid waste management facility. Whilst increased traffic movements as a result of the scheme's road improvements have the potential to result in contamination through accidental oil spills and leaks from road users, the Scoping Opinion subsequently provided by NEMA identifies that a separate ESIA is required to be undertaken for the solid waste facility once the design is sufficiently progressed (see Appendix 4.2). On this basis, it is assumed that a full construction and operational assessment of the predicted impacts relating to the solid waste facility will be provided at a later date and are therefore not considered as part of this assessment.

7.4.2 Construction Impacts

7.4.2.1 Vegetation Clearance and Excavation Works

Activities relating to vegetation clearance and excavation works carried out during the site preparation and construction phase will result in exposure of the fertile top soils to erosion, while the movement of heavy machinery and equipment will lead to soil compaction. This is likely also likely to occur as a result of road construction activities and the construction of temporary access roads, further leading to the permanent removal of fertile topsoil and soil compaction. These alterations of the soil physical conditions will reduce the soil potential for future cultivation, natural vegetation resurgence and activities of the soil organisms. This is considered to be a major adverse effect which is **significant.**

These site clearance activities also have the potential to result in increased runoff during heavy rainfall, leading to the transportation of sediments and potential pollution to nearby watercourses. This may also ultimately contribute to the increased pollution and eutrophication of the inner Murchison Bay (Kansiime et al. 1994, 1995). As a consequence, the quality of the water supply for Kampala, already affected by developments in the Nakivubo and Wankolokolo catchments will receive an extra burden from the Namanve catchment. This is considered to be a major adverse effect which is **significant.**

7.4.2.2 Borrow pits / quarrying

Another potential source of soil erosion will come from borrowing/quarrying activities. Soil compaction at the quarries due to vehicular movements and the open nature of quarries render them prone to erosion from surface

run-off waters. The high demand for construction materials such as sand and murram, may also result in unregulated quarries and borrow pits within Namanve and its surroundings. Surface water runoff from the borrow pits could lead to erosion and subsequent deposition of sediments into the nearby water bodies, leading to pollution.

The above activities are considered to have a moderate adverse effect which is **significant.**

7.4.2.3 Contractor compounds

The contractor and supervising engineers will require at least one compound location on the KIBP for the construction of temporary storage for their facilities (machinery, equipment, materials, etc.). Depending on the types of materials stored in these locations, there is the potential for contaminants to enter the soils and subsequently be washed into received controlled waters (both surface water and groundwater). Due to the large numbers of plant and machinery that will be also be present within the compound areas and the potential for vehicle maintenance to be undertaken, there is also a risk of contamination through leaks and spills of hydrocarbons from fuels, hydraulic oils, etc.

The above activities are considered to have a moderate adverse effect which is **significant.**

7.4.3 Operational Impacts

Improvements to access roads both to and within the KIBP is likely to result in increased traffic movements. As a result, there is greater risk of contamination to surrounding soils through accidental oil spills and leaks from road users being washed into adjacent exposed soils and potentially into receiving waters. Furthermore, the increased extent of hardstanding resulting from the replacement of dirt roads with asphalt will reduce the absorption capacity of the ground, increase surface water runoff and subsequently result in detrimental impacts on soil structure and further soil erosion. These impacts are considered to have a moderate adverse effect which is **significant.**

7.4.4 Summary of Pre-Mitigation Construction and Operation Impacts and Effects

A summary of the pre-mitigation potential impacts and effects are shown in Table 7.3.

Table 7.3: Summary of potential impacts and effects, pre-mitigation

Receptor	Summary of Impact and Effect	Adverse/ Beneficial	Temporary/ Permanent	Impact Magnitude	Receptor Sensitivity	Effect Evaluation	Significance of Effect
Construction Phase							
Agricultural soils	Site clearance activities will impact the soil physical conditions through increased erosion and compaction. The effects of this will reduce the soil potential for future cultivation, natural vegetation resurgence and activities of the soil organisms.	Adverse	Temporary	Major	Medium	Major	Significant
Controlled waters	Site clearance impacts may result in topsoil erosion, leading to potential sedimentation of watercourses contributing to the increasing pollution and eutrophication of the inner Murchison Bay	Adverse	Temporary	Moderate	High	Major	Significant
Controlled waters	Impacts from borrow pit activities and quarrying may result in increased surface water runoff over exposed soils. The effects of this may lead to erosion and subsequent deposition of sediments into the nearby water bodies leading to pollution.	Adverse	Temporary	Moderate	Medium	Moderate	Significant
Controlled waters; human health, ecology	Potentially contaminative materials will be stored within construction compounds, e.g. fuels, concrete, etc. These materials could result in effects on human health and controlled waters in the event of an accidental release, i.e. through leaks and spills of hydrocarbons from fuels, hydraulic oils, etc.	Adverse	Temporary	Major	Medium	Major	Significant
Operational Phase							
Controlled waters, human health, agricultural soils	Potential for leaks and spills associated with increased traffic to the KIBP to be washed into soils and controlled waters, detrimentally affecting quality.	Adverse	Permanent	Moderate	Medium	Moderate	Significant
Controlled waters, human health, agricultural soils	Increase in hardstanding through construction works may lead to greater surface water runoff, resulting in soil erosion and sedimentation of receiving waters	Adverse	Permanent	Moderate	Medium	Moderate	Significant

7.4.5 Mitigation Measures

Contamination of the underlying soil/geology can be readily prevented through implementation of best practice construction techniques. These techniques and measures will be outlined within a CEMP (as shown in Chapter 19) and their appropriate application will be monitored by the Construction Contractor. A summary of the key measures is also presented below.

The Contractor shall take all reasonable measures to prevent spillage and leakage of materials likely to pollute soils and watercourses. Effective contaminative substance and excavated material management procedures will be implemented, such as:

- Fuel and other chemicals storage to be stored in designated areas with potentially contaminating substances stored on drip trays or in double skinned bunded tanks;
- Spill kits available to deal with accidental spillages or leaks to ground;
- Re-fuelling will be via a mobile double-bunded bowser equipped with a spill kit and bunding;
- No refuelling will take place within 10m of a watercourse;
- Potentially contaminated materials will be removed from site as soon as practicable for authorised disposal;
- Storage areas for surplus excavated materials from site grading or excavation works that demonstrate visual or olfactory evidence of contamination will be stored in covered skips, or on a sheeted stockpile placed on hardstanding or impermeable sheeting pending its removal or treatment;
- Precautions will be taken to minimise soil erosion from the site through the use of berms or silt fences; and
- The Scheme will adopt a strategy for the disposal of contaminated spoil which cannot be re-used elsewhere that complies with all relevant waste management legislation in order to ensure that potential significant effects from contaminated spoil disposal are avoided.

Soil erosion will be minimised/or prevented by provisions of efficient drainage systems with well-designed ditches and culverts. Slopes in cut or fill sections will be planted with grass or appropriate vegetation after the completion of the construction works. Special protection should be provided for slopes exceeding 3m height. In erosion prone areas, suitable and indigenous bioengineering materials e.g. sisal should be considered for replanting the slopes.

To mitigate the impact of soil alteration and/or impairment caused by the construction of access roads, detours and the facilities storage compounds, the contractor will need to reinstate these areas to a condition similar to the prevailing situation preceding the road works. Reinstatement should comprise the following:

- Removal of all pavement surfaces;
- Loosening/scarifying of compacted soils;
- Spreading previously stockpiled topsoil;
- Replanting with appropriate grass and trees; and
- Watering and maintenance until their establishment.

Extensive soil compaction can be avoided by the contractor making as much as possible more use of the existing access roads e.g. the Old Kampala-Jinja Road, the existing road to South C Sector through Namilyango, Ddegeya villages, etc. for material transport. Compacted soils will have to be loosened by special ploughs or subsoilers.

Provisions will made to direct surface run-off waters away from the roads by installing side and mitre drains. Introduction of check dams or scour checks in the side drains at specific intervals, depending on the slope gradient will also help to reduce the speed of run-off and its impact.

All drainage structures will be well designed, properly constructed and well maintained in order to prevent surface runoff accumulating by the road sides, ensure water that is drained off does not create gullies, siltation of structures does not occur and preventing accumulated run-off from draining and causing sedimentation into existing water bodies, e.g. Namanve River and Kayobe Swamp.

Measures to protect against impact to human health with respect to land quality issues will include:

- All construction site workers will be adequately trained to recognise and appropriately respond to potential land quality issues. Site welfare facilities and where appropriate, use of decontamination units (i.e. dirty in, clean out welfare units);
- Use of standard construction site personal protective equipment (PPE) in case of contaminated materials being encountered during excavation works (e.g. high visibility clothing, safety boots, hard hat, safety glasses gloves and respiratory equipment); and
- The work area will be well delineated and kept secure to prevent trespass and protect unauthorised people;
- Robust emergency procedures (e.g. with respect to previously unidentified contamination or structures), which are periodically tested and reviewed. In the event of previously unidentified conditions being encountered (e.g. underground storage tanks, drums, contamination), works will be suspended if necessary and specialist advice obtained. Where appropriate, risk assessments will be undertaken and additional control measures implemented prior to any works recommencing.

7.4.6 Residual Effects

Residual effects are those that remain after mitigation and/or enhancement measures have been implemented. A summary of the potential effects that are anticipated to remain after appropriate application of the mitigation measures identified above is presented in Table 7.4.

Table 7.4: Residual impacts and effects noise and vibration impacts after application of mitigation

Receptor	Summary of Impact and Effect	Adverse/ Beneficial	Temporary/ Permanent	Impact Magnitude	Receptor Sensitivity	Effect Evaluation	Significance of Effect
Construction Phase							
Agricultural soils	Site clearance activities will impact the soil physical conditions through increased erosion and compaction. The effects of this will reduce the soil potential for future cultivation, natural vegetation resurgence and activities of the soil organisms.	Adverse	Temporary	Minor	Medium	Minor	Not significant
Controlled waters	Site clearance impacts may result in topsoil erosion, leading to potential sedimentation of watercourses contributing to the increasing pollution and eutrophication of the inner Murchison Bay	Adverse	Temporary	Negligible	High	Negligible	Not significant
Controlled waters	Impacts from borrow pit activities and quarrying may result in increased surface water runoff over exposed soils. The effects of this may lead to erosion and subsequent deposition of sediments into the nearby water bodies leading to pollution.	Adverse	Temporary	Negligible	Medium	Negligible	Not significant
Controlled waters; human health, ecology	Potentially contaminative materials will be stored within construction compounds, e.g. fuels, concrete, etc. These materials could result in effects on human health and controlled waters in the event of an accidental release, i.e. through leaks and spills of hydrocarbons from fuels, hydraulic oils, etc.	Adverse	Temporary	Negligible	Medium	Negligible	Not significant
Operational Phase							
Controlled waters, human health, agricultural soils	Potential for leaks and spills associated with increased traffic to the KIBP to be washed into soils and controlled waters, detrimentally affecting quality.	Adverse	Permanent	Negligible	Medium	Negligible	Not significant

Receptor	Summary of Impact and Effect	Adverse/ Beneficial	Temporary/ Permanent	Impact Magnitude	Receptor Sensitivity	Effect Evaluation	Significance of Effect
Controlled waters, human health, agricultural soils	Increase in hardstanding through construction works may lead to greater surface water runoff, resulting in soil erosion and sedimentation of receiving waters	Adverse	Permanent	Negligible	Medium	Negligible	Not significant

8. Greenhouse Gases

8.1 Introduction

8.1.1 Overview

This chapter assesses the potential Greenhouse Gas (GHG) emissions associated with the construction and operation of the Scheme as described in Chapter 2.

Likely GHG emissions arising in the construction phase include indirect emissions from plant and equipment, emissions from construction-related traffic, and embodied emissions within the materials used in the structures. Operational emissions arise from fuel combusted during the use of vehicles.

8.1.2 Study Area and Area of Influence

8.1.2.1 Area of Influence

The AoI associated with GHG are the emission sources which will have an impact on global climate. The assessment identifies the major potential sources of GHG emissions as a result of the construction and operation phases of the Scheme. These are presented in Table 8.1. The type of emissions aligns with the GHG Protocol guidance which classifies GHG emissions into three 'scopes'[10].

Table 8.1: Potential sources of GHG emissions associated with the Scheme

Emission Source	Type of Emission	Quantified in Assessment?
Construction		
Raw materials	Indirect - Scope 3	Yes
Plant and equipment fuel use	Indirect - Scope 3	Yes
Construction traffic, including transport of raw materials, construction workers and waste to and from site	Indirect - Scope 3	Yes
Temporary worker accommodation/buildings	Indirect - Scope 3	No
Operation		
Traffic	Indirect - Scope 3	Yes
Land-use change	Direct - Scope 1	No
Internal energy use - buildings	Direct - Scope 2	No
External energy use - lighting, CCTV	Direct - Scope 2	No
Sewage and waste water treatment	Direct - Scope 1	Yes
Maintenance of assets	Indirect - Scope 3	No

The main source of direct GHG emissions is the combustion of fuel in construction traffic and plant, and industrial processes. Sources which have been excluded are discussed further in Section 8.1.3 of this chapter.

GHG emissions have been considered for the construction period which is expected to last for three years. Operational GHG emissions have been considered for one year of operation and can be extrapolated for the design life of the assets. Traffic data is based on the projected

[10] https://ghgprotocol.org/sites/default/files/standards_supporting/FAQ.pdf. Scope 1 emissions are direct emissions from owned or controlled sources. Scope 2 are indirect emissions from purchased energy. Scope 3 are indirect emissions (not included in scope 2) in the value chain.

traffic numbers included in the Scheme scope for 2023 which is the end of the construction period.

8.1.3 Assumptions and Limitations

Wherever possible, project specific data has been used to inform the assessment and calculations. Where this was not possible, benchmark data for similar assets has been applied. In the case of uncertainty, a worst-case assumption has been made.

When calculating the capital GHG emissions associated with some assets, detailed design information was not available or is to be finalised at a later design stage. For these, technical judgement was used to assign relevant dimensions and materials to the asset allowing the GHG impact to be calculated. Where a detailed design for a specific asset involving numerous component parts was not available, emissions intensive materials such as concrete were assumed to have an overriding impact so the assessment focussed on estimating the quantity of these materials required. For some small assets, the carbon impact was assumed to be negligible and so these assets were excluded. To account for items not included in this assessment, the final results were uplifted by 5% which provides a conservative 'worst-case' estimate for their impact.

GHG emissions from plant use during construction have been estimated using the total fuel use predicted to be used on-site. In practice, the fuel use will vary dependant on the exact machinery used and schedule of works. There is therefore inherent uncertainty in what the actual GHG impact of plant use might be.

For construction, it has been assumed that all materials have been transported to site using articulated HGVs with a relevant emissions factor applied.[11] Where not otherwise specified, materials have been assumed to be sourced from production sites within Uganda. When materials for one asset are sourced from multiple locations, the distance travelled has been assumed to be an average of the two sites. Where not implicitly stated, the mass of materials to be transported has been calculated by using the density and volume of material or by using a publicly available mass per dimension.

For operational traffic, it is assumed that all freight is containerised and arriving from Ports in Dar-Es-Salaam and Mombasa.

Some potential sources of GHG have been excluded from this assessment as outlined in Table 8.1. Maintenance or refurbishment of assets and emissions from land-use change are not included as the impacts on overall operational emissions over the Scheme lifetime are likely to be minimal.

Other operational emissions included in the project scope but excluded from this assessment are a solid waste facility and waste water treatment works as described in Section 2.4.4. The solid waste facility will primarily serve as a waste transfer station and sorting facility and is intended to process waste arising from the operations of future and present occupiers of the park in addition to waste generated to the operation of the proposed development (i.e. the infrastructure element of KIBP). The wastewater treatment works will treat all effluent discharged by the industries and businesses located within the park.

The Scoping Opinion provided by NEMA identifies that a separate ESIA is required to be undertaken for these facilities once the design for these elements of the project is sufficiently progressed, given that limited design detail is currently known. As such, a detailed assessment

[11] https://ghgprotocol.org/calculation-tools#cross_sector_tools_id

of the impacts and effects arising from the construction and operation of these facilities is not included within this ESIA. However, given their relevance to the remainder of the scheme under consideration as part of this ESIA, a high-level assessment of these elements is included in terms of construction and cumulative effects. The separate ESIA should take any identified impacts and effects related to the solid and liquid waste facilities into consideration and will provide a more detailed assessment.

Operational emissions from other energy use have not been included as this forecast data was not available at the time of this assessment. These would be likely to have a minimal impact on overall emissions from the Scheme.

8.2 Methodology

8.2.1 Applicable Guidelines and Standards

8.2.1.1 Legislation

Uganda is a signatory to the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol and the Paris Agreement. As such, Uganda has agreed to implement policies, measures and legislation which mitigate and adapt to the impacts of climate change. Uganda's Intended Nationally Determined Contribution (INDC), submitted in advance of the 2015 Conference of the Parties (COP) in Paris, outlines measures which could result in a 22% reduction in national GHG emissions by 2030 compared to a business-as-usual scenario.[12]

The Uganda National Climate Policy[13] was developed to help Uganda meet its obligations under the UNFCCC. The goal of the policy is "to ensure a harmonised and coordinated approach towards a climate-resilient and low-carbon development path for sustainable development in Uganda." Some key objectives of the policy include to:

- Identify and promote common policy priorities to address climate change in Uganda;
- Identify and promote adaptation policy responses for Uganda;
- Identify and promote mitigation policy responses for Uganda;
- Identify and promote monitoring, detection, attribution and prediction policy responses for Uganda;
- Support the integration of climate change issues into planning, decision making and investments in all sectors and trans-sectoral themes through appropriate institutional arrangements and legal framework; and,
- Facilitate the mobilisation of financial resources to address climate change in Uganda.

Within Uganda, the Ministry of Water and Environment (MoWE), through its Climate Change Unit (CCU), is responsible for coordinating climate change issues in the country. Climate change is considered in a range of national programmes and pathways. The National Development Plan (NDP) 2015/16-2019/20 incorporates climate change into the development plans, policies and budgets of all sectors of the economy. Similarly, the Uganda Vision 2040 plan, which outlines development strategies to transform Uganda into a "modern and prosperous country", incorporates climate change resilience and low carbon strategies.[13]

[12] https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Uganda%20First/INDC%20Uganda%20final%20%2014%20October%20%202015.pdf

[13] https://www.mwe.go.ug/sites/default/files/library/National%20Climate%20Change%20Policy%20April%202015%20final.pdf

8.2.1.2 Guidelines and Policies

The National Environment Act (NEA) 1995 was established to ensure the environment of Uganda is managed in a sustainable manner.[14] Under the NEA, the National Environment Management Authority and a Statutory Instrument, the Environmental Impact Assessment Regulation (1998), were created.

The following guidelines, from the NEA, indicate the requirements for air quality and GHG standards.

"The National Environment Management Authority shall, in consultation with the lead agency:

- Establish criteria and procedures for the measurement of air quality;
  - Establish ambient air quality standards;
  - Establish occupational air quality standards;
  - Establish emission standards for various sources;
  - Establish criteria and guidelines for air pollution control for both mobile and stationary sources;
  - Any other air quality standard prescribed;
- Take measures to reduce existing sources of air pollution by requiring the redesign of plants or the installation of new technology or both to meet the requirements of standards established under this section;
- Make guidelines to minimise emissions of greenhouse gases and identify suitable technologies to minimise air pollution."

The National Environment Act (2019) is currently being developed and will replace the existing NEA at a date to be confirmed.

Additionally, the ESIA for this Schemeis being conducted to International Finance Corporation (IFC) guidelines. Relevant for the GHG assessment is IFC Performance Standard 3- 'Resource Efficiency and Pollution prevention.'

8.2.2 Determining Magnitude, Sensitivity, and Impact Significance

8.2.2.1 Overview

This section details the methodology used for quantifying emissions associated with the operational and construction phases of the Scheme. The methods adopted are consistent with the guidance set out in Section 8.2.1.2 for this type of project.

8.2.2.2 Calculation approach

For each of the sources above which are to be calculated, the activity or consumption data was multiplied by a published emissions factor from a recognised source:

$$Emissions\ (tCO_2e) = rate\ of\ activity\ (unit)\ x\ emission\ factor\ (tCO_2e/unit)$$

For each source, the activity data and emissions factor are selected using the best available project data and emissions factors.

[14] https://ulii.org/ug/legislation/consolidated-act/153

8.2.2.3 Project data

Activity data to calculate construction GHG emissions has been taken from a range of sources. The type and quantity of materials used in construction has been calculated using the Project Cost Estimation outlined in Section 11.3 of the KIBP Feasibility Report. These estimates are based on the best available preliminary designs and assumptions.

Transport distances for construction materials were based on information provided in the Proposed Work Method Statement (Roads). An estimation of fuel used by construction plant was supplied by the contractor along with an estimated construction schedule and list of construction plant required.

For operational transport, high level aggregated activity data was supplied by the client and assumptions agreed. These are detailed further in Section 8.1.3 of this chapter.

8.2.2.4 Determining significance

It is good practice in an ESIA to assess the significance of effects with reference to the magnitude of the impact and the sensitivity of the receptor. For GHG emissions, the receptor is the global atmosphere. Unlike other environmental impacts, it is difficult to link the emissions of a single project to a location specific receptor. In addition, GHG emissions are closely related to economic growth. In international agreements such as the UNFCC and the Paris Agreement, developing countries are given scope to reduce emissions at a slower rate than developed countries which already have high levels of emissions.

The relationship of individual project emissions to global atmospheric emissions, and uncertainty about the global atmospheric response, is very complex and means that determining the significance of project emissions on a local scale is not possible. The relationship between emissions from individual projects and national or international emissions reduction targets is also difficult to resolve as national and international policies contain provisions for growth and development.

There are currently no published guidelines for determining the significance of project GHG emissions in ESIAs. However, the Guidance Notes for the IFC Performance Standard 3[15] suggest the following criteria for evaluating project GHG emissions (**Table 8.2**). This chapter will therefore not provide a level of effect, or identify if it is considered significant or not, instead recommending how to present the impacts.

Table 8.2: Suggested IFC Criteria for assessing GHG emission impacts

IFC Criteria	Comments
The Project's greenhouse gas emissions relative to the host country's total national emissions	Presented in the Residual Impacts Section (section 8.4.4)
The Project's greenhouse gas emissions performance relative to good international performance or the host country's national average performance	Presented in the National Emissions Profile (Section 8.3.1
The annual trend of the Project's greenhouse gas emissions performance over time	Presented in the Assessment of Effects (Section 8.4)
Opportunities to further improve the Project's greenhouse gas emissions performance.	Presented in the Mitigation Measures section (section 8.4.3)

Source: Guidance Notes for IFC Performance Standard 3

[15] https://www.ifc.org/wps/wcm/connect/25356f8049a78eeeb804faa8c6a8312a/PS3_English_2012.pdf?MOD=AJPERES

8.2.2.5 Baseline determination methodology

Baseline data was collected via a desk-based review. The principal source considered in presenting the baseline assessment was World Resources Institute – CAIT emissions data[16]

8.3 Baseline

8.3.1 National emissions profile

The most recent available inventory of Ugandan GHG emissions has been compiled by the World Resources Institute (WRI) using 2014 data. This contains the latest emissions data from individual sectors as shown in Table 8.3

The "Uganda Second National Communication to the United Nations Framework Convention on Climate Change" in October 2014 was Uganda's latest submission to the UNFCC.[17] It includes a national GHG inventory for the year 2000 and partial data up to the year 2005.

Table 8.3: Uganda national GHG emissions by sector ($MtCO_2e$)

Sector	2014
Energy	8.54
Industrial Processes	1.08
Agriculture	24.00
Waste	0.49
Land-Use Change and Forestry	25.81
Total GHG Emissions Excluding Land-Use Change and Forestry	34.11
Total GHG Emissions Including Land-Use Change and Forestry	59.92

Source: World Resources Institute[18]

Land-use change and forestry is the largest source of GHG emissions in Uganda as a result of forested land being replaced by crop and bush coverage. Traditionally this has been driven by an increase in subsistence agriculture and timber production but also more recently by commercial farming, infrastructure and mining developments.[17] Agriculture is also a main source of GHG emissions. These emissions originate from livestock production, inefficient systems to manage animal waste and the cultivation of soils.[17]

Using the 2014 population figure of 38,833,338, Uganda's total GHG emissions including land-use change and forestry are 1.54 tCO_2e per capita. This is a 71.63% increase on 1990 levels.[18]

8.4 Assessment of Effects

8.4.1 Construction Phase

The construction of the KIBP will lead to emissions of GHGs through the manufacture of materials, construction plant and construction transport. Emissions from these sources are considered both 'scope 3 (indirect)' where the emissions do not occur within the site boundary and are owned by others i.e. manufacture of raw materials, and 'scope 1' (direct) where

[16] http://cait.wri.org/historical

[17] https://unfccc.int/sites/default/files/resource/uganc2.pdf

[18] http://cait.wri.org/profile/Uganda#Equity Indicators

emissions arise at the point of combustion i.e. owned transport/plant. The main sources of construction phase emissions are outlined in Table 8.4.

Table 8.4: Calculated emissions for the construction phase

Emission Source	Quantity (tCO_2e)
Materials	48,190*
Plant and equipment fuel use	21,410
Construction traffic, including transport of raw materials, construction workers and waste to and from site	20,930
Total	**90,530**

* (including a conservative 5% uplift for uncategorised/smaller items)

GHG emissions associated with materials accounts for the largest (53%) proportion of construction GHG emissions. These emissions may be generated from the extraction, processing and manufacture of raw materials.

8.4.2 Operational Phase

This section presents the calculated GHG emissions for the operational phase. This includes GHG emissions from the transport of freight and workers to and from the site on an annual basis. These are displayed in Table 8.5.

Table 8.5: Calculated emissions for the operational phase (per year)

Emission Source	Quantity (tCO_2e)
HGV containerised freight movements	3,132,890
Employee commuting	3,820
Total (per year)	**3,136,700**

These calculations assume 261 working days in a year. The transportation of containerised freight between the site and Dar es Salaam and Mombasa accounts for 99.9% of operational GHG emissions. These emissions are generated from the combustion of diesel fuel in the engine of the HGVs. GHG emissions from employee commuting account for the remaining annual operational emissions.

8.4.3 Mitigation Measures

8.4.3.1 Construction phase

The construction phase will lead to potential indirect emissions due to the construction of the Scheme. These emissions will principally occur through the use of materials and other products, from the transport of those materials and waste to and from the site, and from the use of construction plant.

The following measures are suggested for implementation by the contractor to minimise these sources of emissions as far as possible:

- Use the carbon reduction hierarchy to focus efforts on ‘build less’, challenging the requirement for materials and exploring alternative approaches, including:
  - Use recycled materials in construction where possible, including reuse of materials won on-site; and

  - Source construction materials from the local area where possible to minimise the amount of construction traffic movements, and consider whether certain items could be delivered by rail rather than road;
- Establish sustainable construction management practices. This includes:
  - Toolbox talks for workers about switching off plant and equipment when not in use; and
  - Regular servicing of plant and equipment; and use machinery which is powered using grid electricity rather than diesel or from portable generators. Grid electricity typically has a lower emissions factor.

8.4.3.2 Operational phase

Operational phase GHG emissions included in the scope of this assessment will originate from the transport of workers to and from the site. The following measures will help to minimise these sources of emissions as far as possible:

- Ensure vehicles transporting workers to and from the site are of a high fuel efficiency standard;
- Ensure vehicles transporting workers to and from the site are filled to a high capacity; and
- Implement measures to measure and monitor GHG emissions annually in line with IFC guidance.

8.4.4 Residual Effects

Residual effects are those that remain after mitigation and/or enhancement measures have been implemented.

The Scheme will lead to emissions of GHG, principally CO_2 during the operation of the KIPB. These emissions are expected to arise principally from the transport of freight to and from the business park to the nearest ports. There will be a lower proportion of emissions arising during the 3-year construction phase, largely from the manufacture of the raw materials required.

Emissions from the construction phase of the Scheme will represent a small part of national GHG emissions, at around 0.15% of 2014 levels (including land-use change and forestry).

Annual operational GHG emissions would account for around 5% of national GHG emissions at 2014 levels (including land-use change and forestry).

Emissions are likely to exceed the IFC PS3 threshold for GHG quantification (25MtCO_2/ year).

9. Cultural Heritage and Archaeology

9.1 Introduction

This chapter considers the effects upon cultural heritage and archaeology as a result of the Scheme, considering the conclusions of the previous ESIAs.

9.2 Baseline

9.2.1 History of the Area

The KIBP area was formerly a forest reserve near Kampala city which was degazetted and the area turned into an industrial zone to assist the economic development of Uganda in 1996. There were no people officially living in the area prior to this as it had been a government forest reserve – further details are provided in Chapter 12.

9.2.2 Physical Cultural Resources in the Area

The area, being formerly a forest reserve, did not possess any buildings at all and so there are no buildings of historical or architectural importance for Uganda.

9.2.3 Sacred Places

Enquiries with stakeholders in cultural departments indicated that the area, both currently and historically, did not have any areas for cultural rituals and ceremonies.

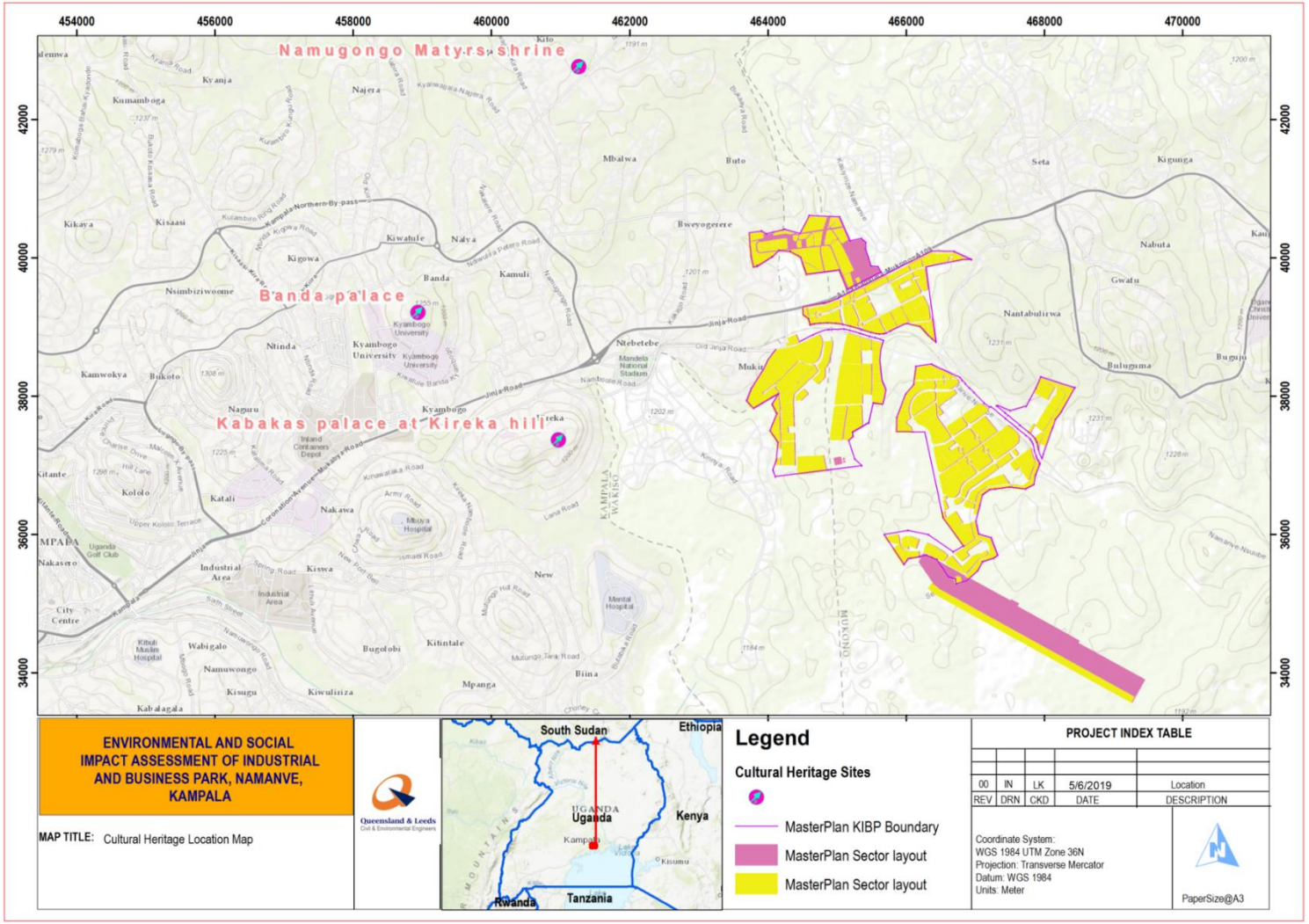
9.2.4 Underground Cultural Resources

The area does not have a history of formal human settlement and has so far not been found to have any underground cultural resources in the infrastructure development which have been undertaken to date. Further enquiries to the following Ugandan institutions confirmed the absence of cultural heritage resources in the area:

- Uganda Museum .
- Cross Cultural Foundation of Uganda.
- Buganda Heritage Tourism Board.
- Buganda kingdom Mukono County (Saza) Headquarters
- The Uganda Society Library.
- National Forest Authority Offices- Namanve

However, this cannot be ruled out completely. To this effect, a chance finds procedure has been developed and is provided in the ESMP.

Figure 4. Cultural heritage sites around the KIBP



9.3 Assessment of effects

Since the area (KIBP) does not have cultural heritage resources, the impact of the Scheme on the heritage resources of Uganda near the park has been investigated. The resources comprise:

- Namugongo Christian Martyrs Shrine (approximately 3.5km from the KIBP);
- Kabala of Buganda Palace at Kireka Hill (approximately 2.7km from the KIBP); and
- Kabaka of Buganda palace at Banda on top of Kyambogo Hill (approximately 4.8km from the KIBP).

It was identified that, given the distance between these resources and the Scheme, activities are not anticipated to interfere with the road network to these sites, or affect the electricity supply or water supply. A map of the area showing the park and the aforementioned heritage sites is presented in Appendix 8.1.

9.3.1 Summary

The investigations carried out have validated the findings of the earlier studies which indicated that there were no cultural heritage resources to be impacted by the proposed infrastructure works at KIBP.

10. Landscape and Visual Amenity

10.1 Introduction

This assessment describes the methodology used to assess landscape and visual impacts, identifies the Area of Influence, its baseline conditions and the sensitive receptors within it, and presents an assessment of the potential impacts to identify where significant effects are expected to arise.

The assessment of landscape and visual effects are separate but linked procedures. Landscape is assessed as an environmental resource and visual effects are considered as one of the interrelated effects on population, as defined in Article 3 of the European Directive on environmental assessment (85/337/EEC). Both aspects have been considered in this assessment.

The following activities have been included in the landscape and visual effects assessment for the Scheme:

- Allocation of value and susceptibility to change to the landscape features;
- An assessment of the sensitivity of people exposed to the views;
- Determination of the magnitude of impact and the likely effects of the Scheme on the landscape and visual amenity of the area; and
- The identification of appropriate mitigation and or compensation as appropriate.

10.1.1 Study Area and Area of Influence

The study area includes the area from which the development will theoretically be visible to a person with a viewer eye height of 1.6m above ground level. The extent of the study area was determined by digitally mapping the zone of theoretical visibility (ZTV) of the development. The ZTV was verified and refined during the site survey.

It should be noted that ZTV mapping tends to overestimate the visibility of a development because the data used does not register the screening effects of existing vegetation or constructions.

10.2 Methodology

10.2.1 Guidelines and standards used

The National Environment Regulations in Uganda (Environmental Impact Assessment, 1998), apply to all projects included in the Third Schedule to the NEA, and to any major repairs, extensions or routine maintenance of any existing project which is included in the Third Schedule to the NEA. The first schedule to these regulations lists issues that need to be considered during EIA studies, including ecological and social considerations, **landscape**, and land use.

The International Finance Corporation (IFC) requires a client seeking funding for their proposed project to assess environmental and social risks using eight Performance Standards. In particular, Performance Standard 6 (PS6; IFC 2012a) and the associated Guidance Note 6 (GN6; IFC 2012b) focus on the protection and conservation of biodiversity. Under PS 6, ecosystem services are organized into four categories, with visual / aesthetic benefits falling into

the category of cultural services, which are the non-material benefits people obtain from ecosystems (IFC, 2012) which may include natural areas that are sacred sites and areas of importance for recreation and aesthetic enjoyment. IFC also states that protecting landscapes is also important due to their role in maintaining biological diversity.

10.2.2 Field surveys

10.2.2.1 Landscape character assessment

The Landscape and Visual Impact Assessment (LVIA) identifies, predicts, and evaluates the potential landscape and visual effects likely to result from the proposed development during construction and operation. The landscape baseline study considers the constituent elements, features and other factors that contribute to existing landscape character within the study area including:

- Physical influences on the landscape resource -including topography, geology, soils, microclimate, water bodies and water courses;
- Influence of human activity – including land use, open space, transport routes, land management, the character of settlement and buildings and the pattern and type of fields and enclosure;
- Aesthetic and perceptual aspects of the landscape – including scale, complexity, openness, tranquillity and wildness; and
- Heritage features – including recognised designation and protection under international, national and local legislation and other elements contributing to historic landscape character and cultural associations.

Key sources of information include satellite imagery, aerial photography, site photography and published documents.

The findings of the desk study were reviewed in conjunction with the site survey to identify local landscape character areas (LCA). These are broadly homogeneous units of distinct features and elements.

The value of each LCA was established by considering statutory designations indicating national or local value and a range of factors including:

- Landscape condition, quality and intactness;
- Scenic quality;
- Rarity (rare elements, features or landscape character type);
- Presence of features of conservation interest (ecological, earth science, historical, cultural);
- Recreational value;
- Perceptual aspects of the landscape such as wildness and/or tranquillity; and
- Cultural or historical associations with, for example, writers, artists, historical events.

10.2.2.2 Visual baseline

The baseline study identifies the people in the area and important, designated or protected views potentially affected by the development. Viewpoints were selected to represent the various visual receptor types in the study area including residential, recreational, tourists, educational, transport, active sports and employment receptors. Viewpoints were also selected to represent specific views valued for their scenic quality or cultural associations or to

demonstrate a specific issue. The selection of viewpoints was based on the extent of the ZTV and findings of the site survey.

Photographs were taken during March and May 2019 to represent the character of the landscape and existing views.

10.2.3 Determining magnitude, sensitivity, and impact significance

The assessment identifies the residual effects likely to arise from the development, taking into account mitigation measures and changes over time. The level and significance of effects were assessed by considering the sensitivity of the receptor and the predicted magnitude of change in relation to the baseline conditions.

10.2.3.1 Landscape

The sensitivity of the landscape was evaluated by considering the existing value of the landscape and its susceptibility to the type of change arising from the proposed development. There can be a complex relationship between the value attached to the landscape and its susceptibility to change, especially if the change is within or close to a designated landscape. A landscape may have a high susceptibility to change but, depending on the type of development, it might accommodate the change without detrimental effect on its key characteristics. In this case its susceptibility to change could be medium or even low. The evaluation of sensitivity was based on the criteria set out in the table below.

Table 10.1: Landscape sensitivity

Landscape value and susceptibility to change	Sensitivity
Typical features may include: Designated landscape. Landscape of high scenic quality with a distinctive combination of features, elements and characteristics, outstanding views and a strong sense of place. A scarce or fragile landscape with cultural, historic or ecological elements which make a major contribution to landscape character. No or very few landscape detractors. Has components which are difficult to replace (such as mature trees). A tranquil landscape in good condition, with an unspoilt, wilderness character. A high susceptibility to change due to the type of development proposed. No or very limited potential for substitution or replacement.	High
Typical features may include: Landscape locally designated or locally valued. Some scenic quality and a moderate sense of place. A landscape with some distinctive features, elements and characteristics. Some cultural, historic or ecological elements which contribute to landscape character. Overall medium tranquillity. Few landscape detractors. A landscape in moderate condition, with some unspoilt characteristics and a moderate susceptibility to change due to the type of development proposed. Some potential for substitution or replacement.	Medium
Typical features may include: Undesignated landscape, not valued for its scenic quality, with a disparate combination of features, elements and characteristics and a weak sense of place. Mainly common features and few or no cultural, historic or ecological elements that contribute to landscape character. Many landscape detractors. A landscape of low tranquillity, in poor condition and a low susceptibility to change due to the type of development proposed. Good potential for substitution or replacement.	Low

Based on GLVIA 3 (LI and IEMA, 2013)

The magnitude of change to landscape character was determined by considering:

- the nature of an impact - whether the introduction of a proposed development will be of benefit or detriment to the existing landscape character;
- the scale of the change - extent of the loss of landscape elements, the degree to which aesthetic features or perceptual aspects of the landscape are altered;
- the geographical extent of the area affected; and
- the duration of the change and its reversibility.

Table 10.2: Magnitude of change to landscape character

Magnitude	Typical Criteria
High	Total loss or substantial alteration to key elements/features/characteristics of the LCA and/or its setting. Addition of new elements which conflict with key characteristics of the existing landscape. Changes that alter a substantial proportion of the LCA. Introduction of long-term and/or irreversible changes to an LCA or its setting.
Medium	Partial loss or alteration to key elements/features/characteristics of the LCA and/or its setting. Addition of new elements or features that are prominent in the landscape but which do not necessarily conflict with key characteristics of the existing landscape. Changes that alter part of an LCA or its immediate setting. Introduction of medium to long term and/or irreversible changes to part of an LCA or its setting.
Low	Slight loss or alteration to one or more key characteristics of the LCA and/or its setting. Addition of new elements or features that are largely characteristic of the existing LCA and/or its setting. Introduction of short to medium term changes to the LCA and/or irreversible changes to a small proportion of the LCA.
Negligible	No change to, or barely perceptible loss or alteration to key characteristics of the LCA and its setting. Addition of new elements or features that are characteristic of the existing LCA and/or its setting. Changes experienced close to the proposed development site at a very localised level.

Based on GLVIA 3 (LI and IEMA, 2013)

10.2.3.2 Visual amenity

The sensitivity of visual receptors was evaluated by considering the value attached to specific views and the susceptibility of visual receptor to changes to views and visual amenity. The susceptibility to change depends on the occupation or activity of the receptor and the extent to which their attention is focused on the view and visual amenity.

The evaluation of sensitivity was based on the criteria set out in Table 10.3.

Table 10.3: Visual receptor sensitivity

Receptor	Sensitivity
Occupiers of residential or tourist properties orientated towards the development and where attention is focused on a landscape of recognised high quality. Walkers and visitors to heritage or tourist assets whose attention is focused on a landscape of recognised high quality. Designated or protected views.	High
People travelling along scenic roads through the landscape. Walkers and visitors to heritage or tourist assets whose attention is focused on a landscape of moderate quality. Occupiers of residential or tourist properties with oblique views of the development.	Medium
People at work and in educational institutions. People engaged in formal sports activities. People on main roads whose attention is not focused on the landscape (such as long-distance travellers).	Low

Based on GLVIA 3 (LI and IEMA, 2013)

The magnitude of change to views was determined by considering:

- Nature of an impact by judging whether the introduction of a proposed development would be of benefit or detriment to the existing view. The impact of a proposed development can be adverse or beneficial.
- Context of the existing view (e.g. whether it is across a natural landscape or whether detracting elements are present);
- Scale and appearance of the proposed development and the degree of contrast/ integration with the existing view;
- Distance of the visual receptor from the development and the angle/ position of view;

- Duration and reversibility of the effect; and
- Geographical extent of the changes to the view.

The evaluation of the magnitude of change was based on the criteria set out in Table 10.4.

Table 10.4: Magnitude of change to views

Magnitude	Typical Criteria
High	Total loss or substantial alteration to key characteristics of the view. Addition of new features or components that are continuously highly visible across the majority of the view and incongruous with the existing view. Substantial changes in close proximity to the visual receptor and within the direct frame of view. Introduction of long term or permanent change uncharacteristic of the view
Medium	Noticeable change or alteration to one or more key characteristics of the view. Addition of new features or components that may be continuously highly visible across much of the view, but are largely characteristic of the existing view. Changes a relatively short distance from the receptor, but partially filtered by intervening vegetation and/or built form, or viewed obliquely. Introduction of medium to long term change uncharacteristic of the view and/or permanent changes largely characteristic of the existing view or affecting a small proportion of the view
Low	Slight loss or alteration to one or more characteristics of the view Addition of new features or landscape components that may be continuously or intermittently visible in part of the view, but are largely characteristic of the existing view from a receptor Changes within the background of the view, largely filtered by intervening vegetation and/or built form, or viewed obliquely Introduction of short to medium term change uncharacteristic of the view and/or long term/permanent changes in a small proportion of the view.
Negligible	No change to, or barely perceptible loss or alteration in the view. Addition of new features or landscape components that are largely inconspicuous and characteristic of the existing view. Changes within the background of the view, viewed as an inconspicuous element within the wider panorama. Change almost entirely obscured by intervening vegetation and/or built form. Short term change affecting a small proportion of the view.

: Based on GLVIA 3 (LI and IEMA, 2013)

10.2.3.3 Significance of effects

Effects may be adverse or beneficial. Major and moderate effects are considered significant.

Professional judgement was used to determine the overall level of significance of effects on landscape and visual receptors in weighing the sensitivity of the receptors against the magnitude of change. The evaluation of the significance of effects was based on the criteria set out in the tables below.

Table 10.5: Significance of effects on landscape character

Significance of effects	Typical Criteria
Major beneficial	A clear improvement or enhancement of existing character. Restoration of characteristic features previously wholly or largely lost through inappropriate management or previous development.
Moderate beneficial	A noticeable improvement or enhancement of existing character. Restoration of valued characteristic features previously largely lost through inappropriate management or previous development.
Minor beneficial	A small improvement or enhancement of existing character. Restoration of valued characteristic features previously partly lost through inappropriate management or previous development.
Negligible	Maintenance of the existing character, sense of place and/or local distinctiveness of the landscape.

Significance of effects	Typical Criteria
Minor adverse	A small deterioration in the existing character due to the loss of characteristic features and or the introduction of uncharacteristic features which detract from the sense of place or local distinctiveness. Effects may relate to a small proportion of the character area.
Moderate adverse	A noticeable deterioration in the existing character due to the loss of characteristic features or the introduction of uncharacteristic features or elements which detract from the sense of place or local distinctiveness. Effects may relate to a part of the character area.
Major adverse	A clear deterioration in the existing character due to the loss of key characteristic features or the introduction of uncharacteristic features or elements which detract from the sense of place or local distinctiveness. Effects may relate to all or a large proportion of the character area.

Based on GLVIA 3 (LI and IEMA, 2013)

Table 10.6: Significance of effects on visual receptors

Significance of effects	Criteria
Major beneficial	A substantial improvement, affecting a large extent of the view.
Moderate beneficial	A noticeable improvement, affecting part of the view.
Minor beneficial	A small improvement, affecting a small extent of the view.
Negligible	No discernible deterioration or improvement in the existing view.
Minor adverse	A small deterioration, affecting a small extent of the view.
Moderate adverse	A noticeable deterioration, affecting part of the view.
Major adverse	A substantial deterioration, affecting a large extent of the view.

Based on GLVIA 3 (LI and IEMA, 2013)

To achieve consistency in the evaluation of the significance of effects, the assessment was also guided by the matrix shown in Table 10.7.

Table 10.7: Significance of effects matrix

Magnitude	Sensitivity		
	High	**Medium**	**Low**
High	Major	Major/moderate	Moderate/minor
Medium	Major/moderate	Moderate	Moderate/minor
Low	Moderate/minor	Minor	Minor/negligible
Negligible	Minor/negligible	Minor/negligible	Negligible

NB. Major and moderate effects are considered significant

10.2.4 ZTV modelling

The modelling of Zones of Theoretical Visibility (ZTV) determines the visibility of an object within the surrounding landscape. ZTV are calculated in a Geographic Information System (GIS) with support of a Digital Elevation Model (DEM), which is a bare-earth grid, compiled from a combination of 50cm Digital Surface Model (DSM), which captures natural and built features on the surface, from proposed project structures, ground elevations of final earthworks and new water extents. The algorithm tests all locations from which the observer can see the object, considering the object height and observer height which are added to the DEM.

The modelling of ZTV determines the extent of the study, helping identify the people in the area and important or protected views potentially affected by the development.

10.2.5 Limitations and assumptions

The infrastructure works for the KIBP will facilitate the progressive implementation of the park to a full operational stage. While the impacts caused by the development of individual plots are not part of the scope of this document, a high-level analysis of the landscape and visual effects of the development of the park is presented in this section as the operational phase. However, timelines for the establishment of individual business and industrial units in the KIBP, as well as individual decisions on the design of these units is unknown, and therefore a detailed assessment of the final visual impacts of the operation of the KIBP is not part of the scope of this report.

10.3 Baseline

10.3.1 Landscape setting

The Mukono District, where the KIBP is located, is a high plain with altitude ranging from 1,099 to 1,300m above sea level. The general slope in the area of the park is southwards within the Lake Victoria drainage basin. The land is mainly low-lying, surrounded by low relief, expressed by a difference of about 180m between hilltops and valleys. The northern sectors of the KIBP (North and South A) display the greatest variation in topography of the Scheme site, typified by broad valleys, which are filled with fine sediments deposited by runoff water. The southern Sectors (South B and C Sectors), closer to the plains of the Namanve wetland, are flatter with minimal topographic variation. The current landscape at the KIBP is que consequence of earthworks initiated after the approval of the park in the early 2000, and presents a significant number of man-made features, including the implantation of industrial activities in the KIBP, which defines a landscape with a high degree of transformation, also characterized by urban areas with different levels of density, characteristic of the Kampala peri-urban areas. Whereas the degree of transformation is significant across the KIBP, the northern Sectors (North and South A) include a number of already developed plots within the KIBP, together with important communication infrastructures (Kampala-Jinja road, old Kampala-Jinja road, and railway line). The southern Sectors present a lower level of development, with the southern parts of South B Sector still boasting wetland vegetation from the Kayobe swamp in the Namanve wetland to the south.

10.3.1.1 Vegetation and land use

The most widespread vegetation cover in Mukono District is of the forest/savannah mosaic characterized by patches of dense forest in the south and scattered trees in shrubs and grassland of the north. The natural vegetation of the Scheme site prior to the intervention from the Forestry Department was originally swamp and closed forest, altered by the tree plantation programme in 1928, clearing most of the indigenous trees and planting Eucalyptus trees (*Eucalyptus robusta* and *Eucalyptus saligna*). Later in 1997 part of the forest reserve was degazetted to provide land for an Industrial Park by the Uganda Investment Authority.

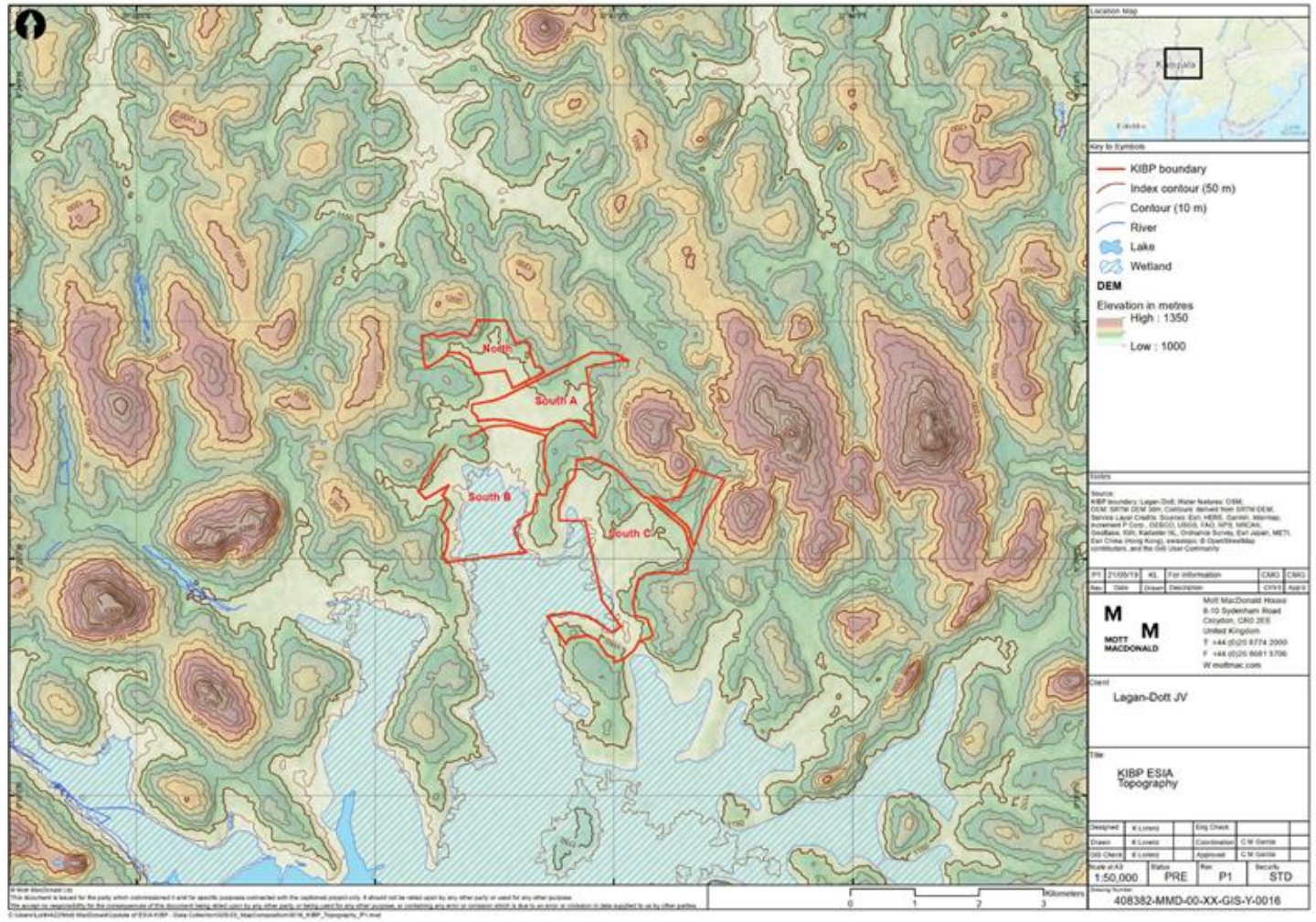
The proposed site for the KIBP consists now mainly of crops grown by members of the local community, small patches of post cultivated bushed swampy grassland and light bushed wetland degraded with agriculture, swampy wooded grassland and typical wetland vegetation in the southern part of the South B Sector, including papyrus.

The Kampala Industrial Business Park (KIBP) at Namanve occupies an area of 894ha, 21 percent of which is wetland. It is one of 22 gazetted business parks around the country. It was designed by the Uganda Investment Authority as a central place where investors can locate factories, warehouses, distribution centers and other business offices.

10.3.1.2 Topography

The Scheme site stands at an average height of about 1,143 m, with slopes southwards towards the Lake Victoria Basin. The land is mainly low-lying surrounded by low relief, expressed by a difference of about 180 meters between hilltops and valleys. This forms a repeating pattern of hill, pediment-slope and swamp-filled valleys. Namanve North and South A present the greatest variation in topography, where the landscape is characterized by alluvial broad valleys filled with fine sediments deposited by runoff water. The wetland area drains southwards into the Kayobe Swamp, which eventually opens out into Lake Victoria at Murchison Bay located to the east of Port Bell.

. Figure 10.1. Topography



Source: : Mott MacDonald

10.3.1.3 Surface water hydrology

The Namanve catchment, where the Scheme is located, is one of eight drainage areas draining into the Inner Murchison Bay. The catchment is boardered by the ridges of hills of Bukasa, Kirinya, Mukireku and Kazinga ot the west. Bbuto, Kiwanga, Namanve and Nantabulirwa to the north, and north-east and Namilyango, Degeya, Senyi and the Zanga Island to the east.

The river Namanve flows a course of approximately 5 km through the proposed site area into the Kayobe swamp and finally into open waters of Murchison bay. It runs through a road culvert on Kampala/Jinja and straightens out on reaching the thickly vegetated area as the river flows into South A Sector, crossing then beneath the Mombasa/Kampala railway and the old Jinja Road and broadening out into the wetland area. The major wetlands that drain into Lake Victoria include Kayobe and Namanve / Bumbulumbu, while other wetlands in KIBP drain into the Victoria Nile and include Nakiyanja and Wankongolo that eventually drains as Lwajali. The river is often blocked during periods of heavy rainfall, and the groundwater table is generally shallow over the entire site.

10.3.1.4 Human settlements

Kampala, the capital of Uganda, is one of the fastest growing African cities with annual growth rates of 5.6% (Vermeiren et al., 2012). This rapid urban growth and the high prevalence of informal economic activities and settlements in Uganda has allowed the urban landscape to spread across Kampala's peri-urban areas. As shown in Figure 10.1, human settlements are present around the park, with higher levels of density in the Wakiso district, closer to the city of Kampala to the west, and lower densities in Mukono, at further distances from the city and the main communication infrastructure.

Figure 10.1. Human settlements around the KIBP.

Source: Mott MacDonald

10.3.1.5 The Namanve Forest Reserve and the Namanve wetland

The Namanve Forest Reserve used to cover an area of about 2,018 ha and a third of this formed the Namanve wetland stretching all the way from Lake Victoria. In 1928 government established a Eucalyptus plantation with drainage channels and later in 1997 part of the forest reserve was degazetted to provide land for an Industrial Park by the Uganda Investment Authority (UNDP, 2016). The Namanve Central Forest Reserve originally comprised tropical rain forest and a wetland/swamp with different plant communities, not completely eliminated by the conversion of the swamp and indigenous closed forest into eucalyptus plantation, and remnant Papyrus and Phoenix swamp was recorded in 2019 biodiversity surveys.

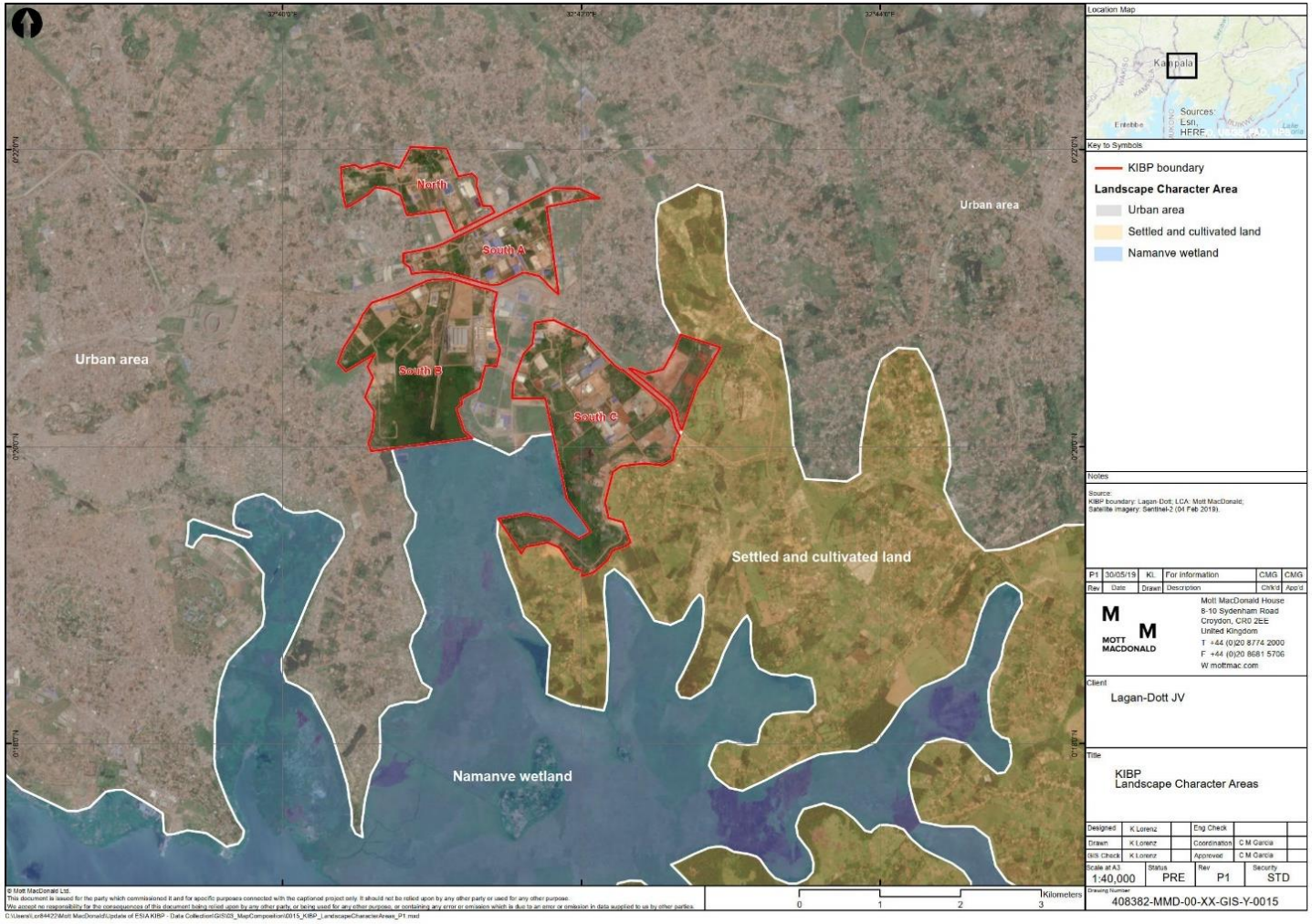
Approximately 0.97km^2 of the KIBP (South B) overlaps with the boundary of the remaining forest reserve, and the remaining protected areas of Namanve Forest Reserve are considered to be of high conservation importance (see Section 6.4 for further information on the boundaries of the Forest Reserve and plant communities in the Scheme area).

10.3.2 Landscape character

The study area has been defined by the extent of the Zone of Theoretical Visibility (ZTV), complemented with site surveys. The vegetation cover in Mukono District is of the forest/savannah mosaic characterized by patches of dense forest in the south and scattered trees in shrubs and grassland of the north. However, significant expansion of low-density human settlements, typical from peri urban areas, are the dominant landscape around the park, with a high number of landscape-detracting elements which have anthropized what was formerly part of the Namanve forest. A mosaic of low density human settlements and cultivated land, as well as the area represented by the Namanve wetland, south of South B and South C Sectors, complement the most representative landscape in the area of influence of the KIBP.

The findings of the desk study were reviewed in conjunction with the site survey to identify local LCAs. These are broadly homogeneous units of distinct features and elements. The landscape character areas within the study area are described below together with representative photographs.

Figure 10.2. Landscape character areas.



Source: Mott MacDonald

10.3.2.1 Urban LCA

The districts surrounding the boundaries of the KIBP are the Wakiso district (the most populous district in the country (UNDP, 2016), and Mukono district, where the KIBP is located.

The fast-growth peri-urban area surrounding the city of Kampala is the most extensive and dominant landscape in the area of influence of the KIBP. The urban area lays around the northern perimeter of the KIBP, surrounding mainly the western boundary of South B Sector, and the North and South A Sectors, within the villages within Wakiso and Mukono. The urban landscape is dominated and highly influenced both visually and acoustically by transport infrastructure: the Kampala to Jinja road and the Old Kampala to Jinja road provide structure to the urban landscape and cross the sectors of the KIBP, separating North and South Sectors (Kampala to Jinja) and South A from South B and C (Old Kampala to Jinja).

The level of density of the character area is variable, with a more dense and urban character to the west, in the Wakiso area, closer to the city of Kampala, and a more peri-urban structure in the eastern area, where human settlements have gained terrain to what was formerly occupied by farmland. There are no significant areas of cultural heritage (see section 9).

Figure 10.3. Different urban typologies within the Urban LCA

Source: Mott MacDonald and Q&L, March 2019.

10.3.2.2 Settled, Cultivated Land LCA

The settled-cultivated land character area extends along the western side of the South C state, in the Mukono district, in areas formerly occupied by extensive areas for cropland, with small patches of tree cover, and laying between the denser urban areas to the north (closer to the Kampala-Jinja road, and the wetlands that extend from the northern shore of Lake Victoria to the boundaries of the park. Most of the natural vegetation was removed for cultivation close to the settlements, and an increase in construction density is expected in the future with further removal of vegetation cover. This sector presents an overall medium tranquillity.

Figure 10.4. Settled, Cultivated Land LCA

Source: Mott MacDonald and Q&L, March 2019.

10.3.2.3 Wetland LCA

Located to the south of Namanve South 'B' and west of South 'C1', the extensive wetlands are an extension of the wetland ecosystem merging southwards into the large Kayobe Swamp fringing Inner Murchison Bay, and a degraded sample of the Papyrus swamp and Phoenix Swamp covering the northern shores of Lake Victoria.

Landscape detractors exist to the northern part of the wetland, in contact with the park and residential areas in the Bukasa village and Kampala municipalities. Within the boundaries of the KIBP, the remnant wetland forest vegetation coexists with sweet potato and sugar cane gardens and Eucalyptus plantations grown by local communities. A more unspoilt and natural landscape is found to south, where disturbance caused by human activities (plating, cultivation, grazing, sand and gravel mining and brick making) is less evident and defines a landscape of high tranquillity.

Figure 10.5. Wetland LCA

Source: Mott MacDonald and Q&L, March 2019.

Table 10.8: Landscape character areas

	Description	Sensitivity
Urban areas	The fast-growth peri-urban area surrounding the city of Kampala is the most extensive and dominant landscape in the area of influence of the KIBP. The urban area lays around the northern perimeter of the KIBP, surrounding mainly the western boundary of South B Sector, and the North and South A Sectors, within the villages within Wakiso and	Low

	Description	Sensitivity
	Mukono. The urban landscape is dominated and highly influenced both visually and acoustically by transport infrastructure: the Kampala to Jinja road and the Old Kampala to Jinja road provide structure to the urban landscape and cross the sectors of the KIBP, separating North and South Sectors (Kampala to Jinja) and South A from South B and C (Old Kampala to Jinja). The level of density of the character area is variable, with a more dense and urban character to the west, in the Wakiso area, closer to the city of Kampala, and a more peri-urban structure in the eastern area, where human settlements have gained terrain to what was formerly occupied by farmland. There are no significant areas of cultural heritage (see section 9).	
Settled-cultivated land	The character area extends along the western side of the South C state, in the Mukono district, in areas formerly occupied by extensive areas for cropland, with small patches of tree cover, and laying between the denser urban areas to the north (closer to the Kampala-Jinja road, and the wetlands that extend from the norther shore of Lake Victoria. Most of the natural vegetation was removed for cultivation close to the settlements, and an increase in construction density is expected in the future with further removal of vegetation cover. Some cultural or social elements (chapel, schools) contribute to landscape character. Overall medium tranquillity.	Medium
Namanve wetland	Located to the south of Namanve South 'B' and west of South 'C1', the extensive wetlands are an extension of the wetland ecosystem merging southwards into the large Kayobe Swamp fringing Inner Murchison Bay, and a degraded sample of the Papyrus swamp and Phoenix Swamp covering the northern shores of Lake Victoria. Landscape detractors exist to the northern part of the wetland, in contact with the park and residential areas in the Bukasa and Kampala municipalities. Within the boundaries of the KIBP, the remnant wetland forest vegetation co-exists with sweet potato and sugar cane gardens and Eucalyptus plantations grown by local communities. A more unspoilt and natural landscape is found to south, where disturbance caused by human activities (plating, cultivation, grazing, sand and gravel mining and brick making) is less evident and defines a landscape of high tranquillity.	High

Source: Mott MacDonald

10.3.3 Zones of theoretical visibility and visual receptors

The land where KIBP is located is mainly low-lying, with southwards slope, a more varied topography in the northern sectors, and flat and broad valleys in the southern states, in contact with the wetland. As a consequence, the characteristic terrain and presence of woodland and build up areas around the boundaries draw a localized zone of visual influence, restricted by topographic, vegetative and artificial screening.

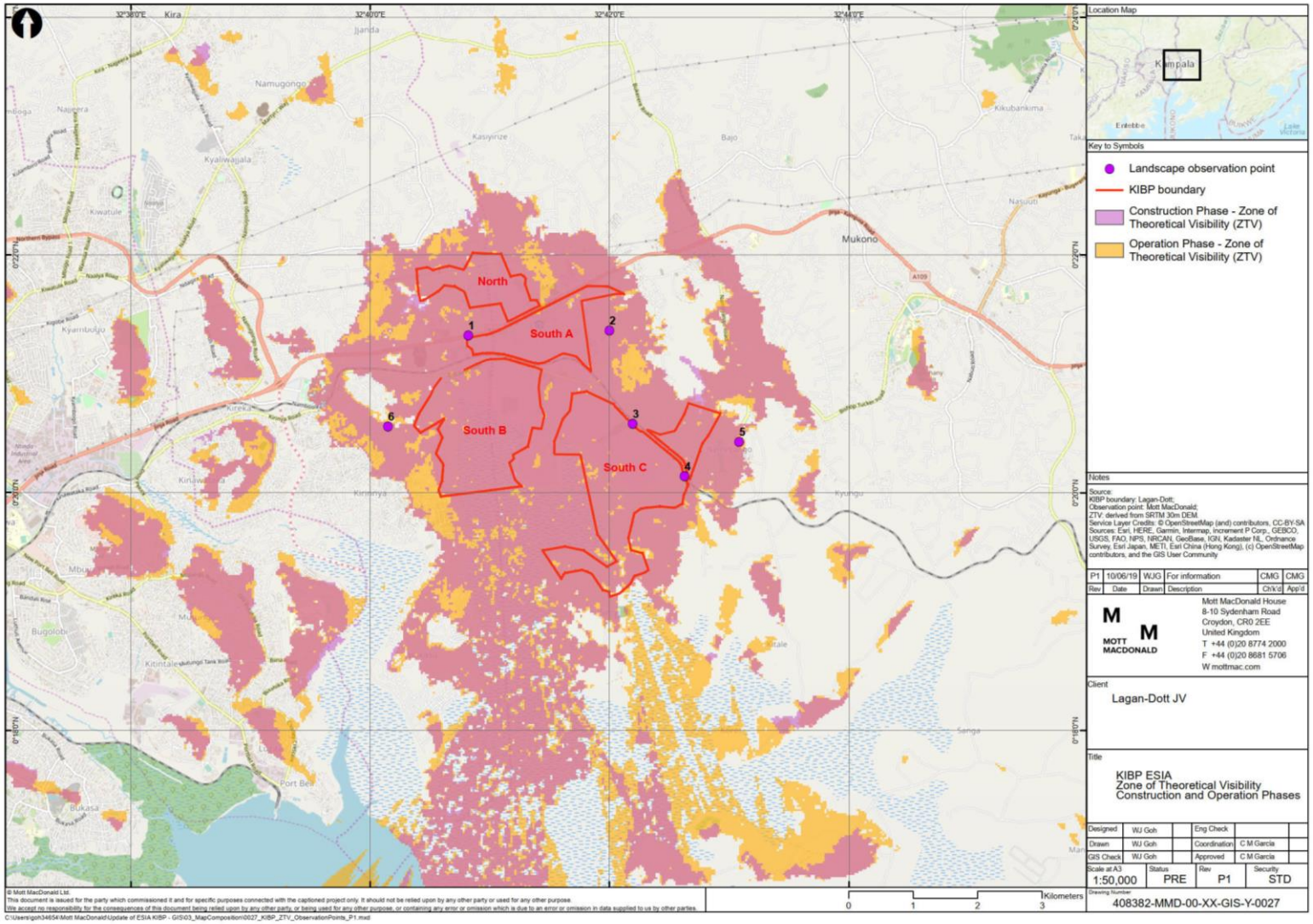
The extent of the study area was determined by modelling the ZTV, generated at construction and operation phases by the presence of the Proposed Scheme. By applying the process of ZTV the visibility of an object can be determined in the surrounding landscape. ZTV can be calculated in a GIS with the help of a DEM. In this case, a DSM was used as the input DEM. A freely available DEM was used, the SRTM DEM with a resolution of 30m (February 2000). Two ZTV's were constructed one for the construction phase and one for the operational phase.

- For the construction phase 17 points were used as input with a height of 3m (location where infrastructure work will take place to represent construction works and machinery) or 10m (to represent the current presence of industrial units). The ZTV for construction phase was created using 10m high points where there are existing industrial units, and 13 points 3m high across scheme components to represent construction works and machinery. The viewshed resulting from the ZTV for construction stage represents a similar situation to the baseline viewshed of the Park today.

- The ZTV for operation phase was created using a worst-case scenario and a fully developed KIBP, using 20 points across scheme components to represent the presence of industrial units. Points with 10m height have been used in agro-processing and light industry areas. Points with 20m height have been used in heavy industry areas.

Figure 10.6 below presents the ZTV for both construction and operational phases. It should be noted that ZTV mapping tends to overestimate the visibility of a development because the data used does not register the screening effects of existing vegetation or constructions.

Figure 10.6. Zones of Theoretical Visibility during the construction and operational phase.



Source: Mott MacDonald

The baseline study identifies the people in the area and important or protected views potentially affected by the development. Viewpoints were selected to demonstrate visibility from existing receptors (human settlements). The selection of viewpoints was based on the extent of the ZTV and the findings of the site survey, which made clear the screening effect from topography as well as existing construction and vegetation in the surrounding area.

Representative viewpoints are set out in Table 10.9 with a narrative on the selection criteria and existing characteristics of the view. While the viewpoints do not represent an exhaustive list of visual receptors, they present the some of the most affected receptors due to proximity and clear views to the scheme.

Pictures taken from the selected viewpoints are shown below.

Table 10.9: Visual receptors

Name	Receptor Name	Receptor selection criteria	Sensitivity	Description of the view
Photo 1	Kampala to Jinja road	Selected as receptor in the northern part of the park, and to represent receptors traveling along the road through the landscape.	Low	Views towards the scheme are open and in different directions, as the road crosses the park splitting the North and South A Sectors. High presence of detracting man-made elements in the view (infrastructure, vehicles and industrial/residential buildings).
Photo 2	Guest house in Nantabulirwa	Selected as a point outside the boundaries of the KIBP to assess the sensitivity of the location in Nantabulirwa village to possible changes to the view resulting from the Scheme, and mainly to further developments in the Park.	Medium	Open views of Scheme area due to the elevation of the point selected, which exemplifies the view of visitors and residents in existing buildings along the road from Seeta to the Park. The presence of buildings along the road, as well as screening from vegetation limits the visibility from lower points. The uneven status of development of the park is very visible from this point, and the presence of existing industrial plots reduce the sensitivity of the receptor.
Photo 3	Nantabulirwa Ward	Selected to review the sensitivity of the location on the eastern boundary of the park and close to residential areas from the Nantabulirwa ward village.	Low	Open views of most of the Park, with the South C sector in the foreground. There are detracting man-made elements in the view which correspond to existing developments of industrial plots in the Park and the existing railway infrastructure.
Photo 4	Namilyango-Kisenyi	Selected as close to the Namilyango-Kisenyi residential area and with wide views of South C sector.	Medium	Low lying viewpoint close to the boundary of the Park. Open view of the Park, with presence of detracting man-made elements (industrial developments) which are, at the moment, of low density.
Photo 5	Namilyango chapel and village	Selected as a point outside the boundaries of the KIBP, and as reference for the Namilyango village.	Medium	Elevated point with views to the Park which are, however, screened by the presence of vegetation and existing residential constructions. There will be visibility from the residential plots with foreground view to the eastern boundary of South C sector.
Photo 6	Kirinya village	Selected as a point outside the boundaries of the KIBP and a receptor from the surrounding western area of influence, in the boundaries of the Kirinya and Wakiso municipalities.	Medium	Low lying point, highly screened by the existing vegetation, varied topography. The visibility will vary significantly within the neighbourhood.

Figure 10.7. From the Kampala-Jinja road, towards the east. South A sector on the right.

Source: Mott MacDonald and Q&L, March 2019.

Figure 10.8. Photo from a Guest house in Nantabulirwa. Open views of South A sector.

Source: Mott MacDonald and Q&L, March 2019.

Figure 10.9. Photo from the Nantabulirwa Ward, view of the northern part of South C.

Source: Mott MacDonald and Q&L, March 2019.

Figure 10.10. Photo from Namilyango-Kisenyi. Open view of the middle part of South C.

Source: Mott MacDonald and Q&L, March 2019.

Figure 10.11. Photo from the Namilyango chapel. Distant views of South C with screening from existing houses.

Source: Mott MacDonald and Q&L, March 2019.

Figure 10.12. Photo from the Kirinya neighbour, medium-distant views of the western part of South B.

Source: Mott MacDonald and Q&L, March 2019.

10.4 Assessment of Effects

10.4.1 Construction Phase

The target construction period for the development of KIBP infrastructure is 36 months and the construction methodology is expected to follow the schedule presented below:

2. Site clearance, estimated for 60 days.
3. Drainage works, estimated for 540 days.
4. Road network and bridge, estimated for 900 days.
5. Water supply, estimated for 730 days.
6. Construction of water reservoirs, estimated for 730 days.
7. Construction of sewerage network, estimated for 730 days.
8. Waste treatment plant, estimated for 730 days.
9. MN power services, estimated for 459 days.
10. Fibre optic services and CCTV services, estimated for 600 days.
11. Street lighting, estimated for 570 days.
12. Ancillary works, estimated for 180 days.

During construction, the main tasks with a potential to cause landscape and visual effects will include:

- Presence of construction compounds and the clearance of existing farmland and woodland vegetation;
- Presence and views of floodlighting, in construction camps and especially if night time works are required. Public lighting is limited in most of the settlements (especially those located in the southern areas of South C), and therefore artificial lighting might cause a significant visual change;
- Elevated noise can affect enjoyment of public open spaces and degrade local acoustic landscapes, especially in areas close to human settlements;
- Presence of construction traffic, including private vehicles belonging to site staff; and
- Movement of excavated earth and change in the landform on site and storage of topsoil mounds.

The majority of the receptors who would experience adverse effects from the infrastructure works are located within close proximity to the site itself and lay adjacent to the site boundary. The most apparent changes to landscape character and views during construction will result from: the temporary presence and activity of heavy equipment (heavy-duty vehicles and other heavy machines) undertaking earthwork operations and construction tasks in the Namanve Industrial and Business Park; removal of existing landscape elements such as remains of existing vegetation and agricultural land. The loss of existing vegetation, the presence of large-scale construction activities and reduction in tranquillity will affect the landscape character, especially in the least developed areas to the south of South B and South C Sectors.

Although construction works will be clearly apparent in close proximity to the proposed scheme, the flat topography of the plain in the southern part of the park (South B and C), and the presence of perimetric walls, existing vegetation and topography to the east, north and west of the park will limit wider visibility of the majority of the construction activity, as shown in the ZTV maps produced (see Section 10.3.3).

The main group of visual receptors likely to be affected by the construction works will be residents in settlements located close to the park boundaries:

- North: visible from the closest properties in Mawotto village in the west, from elevated properties in Butto village (in the north), Kazinga Main village in the sourth, and some elevated areas in Kiwanga Lwanda village.
- South A: will be visible mainly from residential properties along the western side of the main road in Nantabulilrwa village (NE-SW from Seeta village to the Park)
- South B: visible from the closest properties in Wakiso village, Kireku railway and Namataba village.
- South C: visible from Nantabulilrwa village, elevated and close properties in Namilyango-Kisenyi village, and some scattered and close human settlements in Degeya-Ssenyi village.

Whereas North, South A and the northern parts of South B and South C are partially developed and include a number of landscape detractors (roads, railway, residential and industrial buildings), the presence of construction activities will disrupt the level of tranquillity in residential areas closer to the Navanve wetland in the south of South B (Namataba village) and to the east and south of South C (Namilyango-Kisenyi village). It is important to note, however, previous transformation of the original landscape (vegetation clearance and construction of perimetric walls), as well as the screening effect from existing constructions (in Namataba village), and the low residential density and screening effect from vegetation screening (in Namilyango-Kisenyi village).

10.4.1.1 Landscape assessment

The following table describes the likely effects on landscape character during construction.

Table 10.10: Effects on landscape character in construction

LCA	Existing landscape character	Impacts during construction	Effect
Urban areas	The fast-growth peri-urban area surrounding the city of Kampala is the most extensive and dominant landscape in the area of influence of the KIBP. The urban area lays around the northern perimeter of the KIBP, surrounding mainly the western boundary of South B sector, and the North and South A sectors, within the villages within Wakiso and Mukono. The urban landscape is dominated and highly influenced both visually and acoustically by transport infrastructure: the Kampala to Jinja road and the Old Kampala to Jinja road provide structure to the urban landscape and cross the sectors of the KIBP, separating North and South Sectors (Kampala to Jinja) and South A from South B and C (Old Kampala to Jinja).	Impacts during construction stage will result mainly from the presence of large-scale construction activities, fencing and temporary material stockpiles in an urban landscape setting. The change to the character and setting of the area will differ depending on the current presence of industrial use and infrastructure. While construction works will not result in an alteration of the LCA in most of urban areas (close to the Kampala-Jinja road, where industrial development coexist with medium-density residential areas), the magnitude of change in lower-density residential areas such as Wakiso and Namataba, which grow closer to the Namanve wetland, will be of medium significance.	The overall low magnitude of change combined with the low sensitivity of the character area will result in a **minor adverse effect** on the landscape character of Urban area LCA during construction.
Settled-cultivated land	The level of density of the character area is variable, with a more dense and urban character to the west, in the Wakiso area, closer to the city of Kampala, and a more peri-urban structure in the eastern area, where human settlements have gained terrain to what was formerly occupied by farmland. There are no significant areas of cultural heritage	The movement of heavy vehicles and presence of large-scale construction activities in a tranquil environment will result in an alteration of the largely rural character of this landscape setting. The addition of new detracting elements will alter part of the LCA, however, the current presence of the park, although underdeveloped at the moment, minimises the magnitude of change in the overall area caused by a further deterioration in the existing rural character.	The low magnitude of change combined with the medium sensitivity of the character area will result in a **minor adverse effect** on the landscape character of the Settled, Cultivated. Land LCA during construction.
Namanve wetland	The character area extends along the western side of the South C state, in the Mukono district, in areas formerly occupied by extensive areas for cropland, with small patches of tree cover, and laying between the denser urban areas to the north (closer to the Kampala-Jinja road, and the wetlands that extend from the norther shore of Lake Victoria. Most of the natural vegetation was removed for cultivation close to the settlements, and an increase in construction density is expected in the future with further removal of vegetation cover. Some cultural or social elements (chapel, schools) contribute to landscape character. Overall medium tranquillity.	The construction activities associated with the infrastructure to be located in the southern part of South B and south-western part of South C sectors (solid treatment plant, sewage treatment plant, road network, etc.) will be the main source of impact on this LCA during construction stage. Construction works will imply removal of existing vegetation in the wetland within the boundaries of the park (a mosaic of Cyperus papyrus, Phoenix and crops grown by neighbouring communities) and introduction large scale construction activity in a landscape of scenic quality. Whereas the areas within the park do not share the unspoilt wilderness character of the swamp further south, and existing human settlements to the west (together with existing KIBP infrastructure already altering the wetland), the loss of wetland vegetation and other current vegetation cover (eucalyptus plantation and sweet potato/sugar cane crops), as well as the presence of construction machinery and heavy vehicles will add new elements which conflict with the key and most valuable characteristics of the existing landscape, resulting in a change of medium magnitude.	The medium magnitude of change and the high sensitivity of the character area will result in a **major adverse effect** on the landscape character of the Namanve wetland.

10.4.2 Visual assessment

The following table describes the likely effects on visual receptors during construction.

Table 10.11: Effects on visual receptors in construction

Viewpoint and visual receptor	Existing view	Impacts during construction	Effect
1. Kampala to Jinja Road	Views towards the scheme are open and in different directions, as the road crosses the park splitting the North and South A sectors. High presence of detracting man-made elements in the view (infrastructure, vehicles and industrial/residential buildings).	Visibility of construction works will be visible from the road. However, due to the presence of industrial activity and high traffic of heavy vehicles in the area, the deterioration in the existing character will not be significant.	The minor magnitude of change and the low sensitivity of the receptor will result in a **minor adverse** effect.
2. Guest house in Nantabulirwa	Open views of Scheme area due to the elevation of the point selected, which exemplifies the view of visitors and residents in existing buildings along the road from Seeta to the Park. The presence of buildings along the road, as well as screening from vegetation limits the visibility from lower points. The uneven status of development of the park is very visible from this point, and the presence of existing industrial plots reduce the sensitivity of the receptor.	Visibility of construction works from this residential area will range from close views (up to 500m) to mid-distance views (500 to 1000m). Existing industrial plots in the sector reduce both receptors' sensitivity and the perceived magnitude of change that the construction works might have in the area	The minor magnitude of change, and the moderate sensitive of the receptor will result in a **minor adverse** effect
3. Nantabulirwa Ward	Open views of most of the Park, with the South C sector in the foreground. There are detracting man-made elements in the view which correspond to existing developments of industrial plots in the Park and the existing railway infrastructure.	Construction works will be visible from the settlements located along the Bweyogere industrial area road, and from further residential area in the Nantabulirwa Ward village. While the views to the Park show an underdeveloped area, the current presence of industrial bays (Roofing Rolling Mills), the existing railway and traffic along the road minimises the magnitude of change.	The minor magnitude of change combined with the medium sensitivity of the receptor will result in a **minor adverse** effect.
4. Namilyango-Kisenyi	Low lying viewpoint close to the boundary of the Park. Open view of the Park, with presence of detracting man-made elements (industrial developments) which are, at the moment, of low density.	Construction works will be closely visible from the settlements located in the southern boundaries of the Park (South C sector, which are partially screened by concrete walls in some sectors.	The medium magnitude of change combined with the medium sensitivity of the receptor will result in a **moderate adverse** effect.
5. Namilyango chapel and village	Elevated point with views to the Park which are, however, screened by the presence of vegetation and existing residential constructions. There will be visibility from the residential plots with foreground view to the eastern boundary of South C sector.	Visibility of construction works in the eastern part of South C sector will range from close views (up to 500m) to mid-distance views (500 to 1000m). The screening effects from existing houses and vegetation will limit the views from this religious site.	The low magnitude of change combined with the high sensitivity of the receptor will result in a **moderate adverse** effect.
6. Kirinya village	Low lying point, highly screened by the existing vegetation, varied topography. The visibility will vary significantly within the neighbourhood.	Viewpoint located in a low-lying area to the west of South B sector, and very vulnerable to screening effects from vegetation and constructions. The visibility from this receptor is unlikely and the magnitude of change is expected to be low from this point.	The low magnitude of change combined with the medium sensitivity of the receptor will result in a **minor adverse** effect.

10.4.3 Operation Phase

This ESIA and LVIA section assesses the landscape and visual impacts resulting from the development of the infrastructure in the KIBP. However, the infrastructure works will facilitate the progressive implementation of the KIBP to a full operational stage, and therefore the transformation of an already anthropized but underdeveloped open area covered with a mosaic of subsistence crops, wetland, industrial units and bare ground areas into a fully occupied business and industrial park. While the impacts caused by the development of individual plots are not part of the scope of this document and will be addressed in detail by plot-specific ESIAs, a high-level analysis of the landscape and visual impact of the potential development of the Park is presented here as operational phase.

Potential impacts and effects on landscape character and visual amenity during operation include:

- Further construction works in individual business and industrial plots once the infrastructure of the park is fully established and operational.
- Significant increase in traffic due to construction and operation of individual activities in the industrial and business plots.
- Introduction of large volumes in the landscape (residential and business buildings, and industrial units) made of artificial material (concrete, steel, etc.) into the Scheme area.
- Permanent lighting in Scheme facilities might cause visual pollution; and
- Permanent built scheme elements including the water treatment plant, substation, lighting power house, industrial and business units, etc., will be established within the boundaries of a largely transformed environment. The extent of the visibility resulting from the development of the infrastructure assessed in this ESIA will not significantly increase the number of current receptors.

As in construction landscape and visual impacts, previous earthworks and development of infrastructure as a result of the establishment of the KIBP, created in 1997, have already transformed the original landscape settings of the site, and have therefore reduced receptors' sensitivity to change and the magnitude of change that the operation works might have in the landscape character areas.

The viewshed of the park will be increased by new presence of industrial units. However, visibility of the site will be partially obscured the topography of the area, perimeter walls and existing buildings and vegetation screening outside of the boundaries of the park, and therefore the main group of visual receptors likely to be affected by the operation of the Park will mainly be residents in settlements located around the park boundaries (see Section 10.4.1 for an indication of potential receptors).

The new occupation of currently empty plots, and the significant increase in operation traffic, will be detrimental to those landscape character areas characterized by a high level of tranquillity and absence or low presence of landscape detractors (settled and cultivated areas and especially the Namanve wetland).

10.4.3.1 Landscape assessment

The following table describes the likely effects on landscape character during operation.

Table 10.12: Effects on landscape character in operation

LCA	Existing landscape character	Impacts during operation	Effect
Urban areas	The fast-growth peri-urban area surrounding the city of Kampala is the most extensive and dominant landscape in the area of influence of the KIBP. The urban area lays around the northern perimeter of the KIBP, surrounding mainly the western boundary of South B sector, and the North and South A sectors, within the villages within Wakiso and Mukono. The urban landscape is dominated and highly influenced both visually and acoustically by transport infrastructure: the Kampala to Jinja Road and the Old Kampala to Jinja Road provide structure to the urban landscape and cross the sectors of the KIBP, separating North and South sectors (Kampala to Jinja) and South A from South B and C (Old Kampala to Jinja).	Impacts during operation stage will result mainly from the permanent presence of new infrastructure and new business and industrial buildings in an urban landscape with a heterogeneous level of tranquillity. The change to the character and setting of the area will differ depending on the current presence of landscape detractors, high in the northern sector of the park (close to the Kampala-Jinja road, where industrial development coexists with medium-density residential areas), and lower in low density urban sectors west of South B sector, in Namataba, or east to South A, in Nantabuirwa. The current status of development in those sectors of the park close to residential areas (northern part of South B, South A and North sectors), will reduce the magnitude of change.	The low magnitude of change combined with the low sensitivity of the character area will result in a **minor adverse effect** on the landscape character of Urban area LCA during construction.
Settled-cultivated land	The level of density of the character area is variable, with a more dense and urban character to the west, in the Wakiso area, closer to the city of Kampala, and a more peri-urban structure in the eastern area, where human settlements have gained terrain to what was formerly occupied by farmland. There are no significant areas of cultural heritage	Permanent presence of Scheme infrastructure and potential development of new buildings will introduce new structures in the boundaries of a largely rural landscape setting. While the status of development in the southern sectors of the KIBP is not significant, intermittent fencing and some isolated have transformed the landscape, and therefore minimising the magnitude of change caused by the full development of the park that will occur as a result of the infrastructure development.	The medium magnitude of change combined with the medium sensitivity of the character area will result in a **medium adverse effect** on the landscape character of the Settled, Cultivated. Land LCA during construction.
Namanve wetland	The character area extends along the western side of the South C state, in the Mukono district, in areas formerly occupied by extensive areas for cropland, with small patches of tree cover, and laying between the denser urban areas to the north (closer to the Kampala-Jinja road, and the wetlands that extend from the norther shore of Lake Victoria. Most of the natural vegetation was removed for cultivation close to the settlements, and an increase in construction density is expected in the future with further removal of vegetation cover. Some cultural or social elements (chapel, schools) contribute to landscape character. Overall medium tranquillity.	While the loss of remnant wetland forest vegetation and existing plantations (eucalyptus, sweet potato and sugar cane) will happen during construction, the anthropic pressure applied by the development of infrastructure and new operations in the park will contrast with the characteristics of the wetland LCA and expand the wider disturbance caused by the current presence of farmland and build up sectors in the nearby areas. The magnitude of change will be medium.	The high magnitude of change and the high sensitivity of the character area will result in a **major adverse effect** on the landscape character of the Namanve wetland.

Source: Mott MacDonald

10.4.3.2 Visual assessment

The following table describes the likely effects on visual receptors during operation. Photomontages for selected viewpoints are reproduced in figures above.

Table 10.13: Effects on visual receptors in operation

Viewpoint and visual receptor	Existing view	Impacts during operation	Effect
1. Kampala to Jinja road	Views towards the scheme are open and in different directions, as the road crosses the park splitting the North and South A sectors. High presence of detracting man-made elements in the view (infrastructure, vehicles and industrial/residential buildings).	The KIBP infrastructure and potential developments will be visible from the road. The current presence of industrial activity and high traffic of heavy vehicles in the area will minimise the magnitude of change caused by the Scheme.	The minor magnitude of change and the low sensitivity of the receptor will result in a **minor adverse** effect.
2. Guest house in Nantabulirwa	Open views of Scheme area due to the elevation of the point selected, which exemplifies the view of visitors and residents in existing buildings along the road from Seeta to the Park. The presence of buildings along the road, as well as screening from vegetation limits the visibility from lower points. The uneven status of development of the park is very visible from this point, and the presence of existing industrial plots reduce the sensitivity of the receptor.	The full development of the park will be very visible from this residential area and will range from close views (up to 500m) to mid-distance views (500 to 1000m). The current development of South A sector, and the foreground view from the guest house and Nantabulirwa, will reduce the magnitude of change caused by new developments.	The medium magnitude of change, and the moderate sensitive of the receptor will result in a **moderate adverse** effect
3. Nantabulirwa Ward	Open views of most of the Park, with the South C sector in the foreground. There are detracting man-made elements in the view which correspond to existing developments of industrial plots in the Park and the existing railway infrastructure.	The development of the park after infrastructure is fully operational will be visible from the settlements located along the Bweyogere industrial area road, and from further residential area in the Nantabulirwa Ward settlement. The current presence of industrial bays (Roofing Rolling Mills) the existing railway and traffic along the road minimises the magnitude of change.	The medium magnitude of change combined with the medium sensitivity of the receptor will result in a **moderate adverse** effect.
4. Namilyango-Kisenyi	Low lying viewpoint close to the boundary of the Park. Open view of the Park, with presence of detracting man-made elements (industrial developments) which are, at the moment, of low density.	The development of the park will be closely visible from the settlements located in the southern boundaries of the Park (South C sector, which are partially screened by concrete walls in some sectors).	The medium magnitude of change combined with the medium sensitivity of the receptor will result in a **moderate adverse** effect.
5. Namilyango chapel and village	Elevated point with views to the Park which are, however, screened by the presence of vegetation and existing residential constructions. There will be visibility from the residential plots with foreground view to the eastern boundary of South C sector.	Visibility of the new developments in the eastern part of South C sector will range from close views (up to 500m) to mid-distance views (500 to 1000m). The screening effects from existing houses and vegetation will limit the views from this religious site.	The low magnitude of change combined with the high sensitivity of the receptor will result in a **moderate adverse** effect.
6. Kirinya village	Low lying point, highly screened by the existing vegetation, varied topography. The visibility will vary significantly within the neighbourhood.	Viewpoint located in a low-lying area to the west of South B sector, and very vulnerable to screening effects from vegetation and constructions. The visibility from this receptor is uncertain and the magnitude of change is expected to be low from this point.	The low magnitude of change combined with the medium sensitivity of the receptor will result in a **minor adverse** effect.

10.4.4 Summary of construction and operation impacts

The construction and operation effects of the Scheme upon Landscape and Visual Amenity, prior to the implementation of mitigation, is presented in Table 10.4.

Table 10.14: Summary of Impacts and Effects – Pre-mitigation

Receptor	Summary of Impact	Adverse/ Beneficial	Temporary/ Permanent	Impact Magnitude	Receptor Sensitivity	Effect Evaluation	Significance of Effect
Construction Phase							
Representative views from urban viewpoints (Nantabulirwa and N. ward village	Change in tranquillity of the landscape character due to temporary presence of HGV movements and earthworks	Adverse	Temporary	Minor	Low	Minor adverse	Not significant
Representative views from Settled-cultivated land viewpoints (Namilyango-Kiseni and Namilyango village)	Change in tranquillity of the landscape character due to temporary presence of HGV movements and earthworks	Adverse	Temporary	Moderate	Medium	Moderate adverse	Significant
Visitors to the Namanve wetland	Removal of the reminder of wetland vegetation and increase of anthropization of a natural area	Adverse	Temporary	Moderate	High	Moderate adverse	Significant
Operational Phase							
Representative views from urban viewpoints (Nantabulirwa and N. ward village	Change in tranquillity of the landscape character due to significant HGV movements and high density of new business and industrial units.	Adverse	Permanent	Minor	Low	Minor adverse	Not significant
Representative views from Settled-cultivated land viewpoints (Namilyango-Kiseni and Namilyango village)	Change in tranquillity of the landscape character due to significant HGV movements and high density of new business and industrial units.	Adverse	Permanent	Moderate	Medium	Moderate adverse	Significant
Visitors to the Namanve wetland	Removal of the reminder of wetland vegetation and increase of anthropization of a natural area	Adverse	Permanent	Moderate	High	Major adverse	Significant

10.4.5 Mitigation Measures

Table 10.15 below provides a summary of mitigation and enhancement measures for impacts identified in this chapter.

Table 10.15: Mitigation and enhancement measures

Type of measure	Detail
Avoidance and Mitigation of construction effects	Construction is expected to be carried out using industry best practice to reduce potentially adverse effects (including dust control which could increase visibility of the construction area). The following mitigation measures are proposed in order to mitigate the significant construction effects identified in this assessment: • Construction compounds (contractor camps, offices and work areas) will use former quarries and other already disturbed/developed areas, as far as possible, to minimise impacts on vulnerable wetland or settled and cultivated areas with high levels of tranquillity. • Introduce additional screening in locations where a moderate visual impact has been identified due to the proximity of the proposed works or lack of existing visual barriers. It is recognised that planting will not totally screen development of the scale proposed, but it will help to integrate the development into the landscape and soften views of the development. Using suitable species of local provenance will provide additional landscape structure, adding more value at operation stage. Introducing areas of additional planting ahead of the construction activity as part of an advanced works package will help to establish the screening elements before work commences. • Perimeter fences and ancillary structures in construction camps will be painted using visually recessive colours to reduce visual impact. Colours will be chosen to reflect the muted greens and browns present in surrounding landscape. As an example, a pale grey green colour can be used when close to woodland. • Lighting associated with the construction phase of the proposed development will be designed to minimise light pollution at night, whilst being consistent with the requirements of site safety and security. Directional and task focussed lighting will be used where possible, rather than lighting on tall columns, and will be designed to face away from sensitive residential receptors. Construction works will be limited to daylight hours, and therefore illumination needs will be restricted to accommodation camps. • Contractors will be required to maintain clean and tidy sites through clauses in contract documentation and will be regularly monitored by EHS manager. • When vegetation is removed from the cleared sites (trees with calorific value), they will be dried and offered to members of the local community to use as firewood. • Temporary construction areas that will not be incorporated into the operational phase should be rehabilitated with native vegetation at the end of the construction phase. • In those ecological areas of conservation relevance, such as the Namanve wetland, retain ecological integrity by avoiding and minimising unnecessary vegetation losses. As explained in biodiversity section, the locations and footprints of the works will be chosen to avoid the wetland habitats. No construction activities to take place within wetland habitats e.g. vehicle access, equipment storage etc.
Avoidance and Mitigation of operation effects	Mitigation measures incorporated into the general landscaping for the park will include: • Areas of mitigation planting in the area where the park transitions into the Namanve wetland in South B and South C sectors will be included in the Scheme scope to minimise affectation to this natural area of conservation importance and help integrate the large-scale industrial operations into the landscape; • Scheme design will incorporate measures for integrating the infrastructure into the surrounding environment through consideration of using natural materials when possible, especially in those areas in close proximity to natural vegetation (south of South B and west of South C sectors). Locally typical and appropriate materials will be used in some of the details, for example using treatments which would help the buildings fit into their landscape setting. Reflective surfaces which would gleam in the sun and draw attention to the facilities will be avoided. Visual mitigation measures for permanent infrastructure (solid waste treatment plant and sewage treatment plant) might include cladding or painting of the exterior of built elements. Colours will be chosen to reflect the muted greens and browns present in surrounding landscape. Such measures will be included as requirements at tender design stage. • Permanent perimeter fencing around facilities and infrastructure will be painted using visually recessive colours to reduce visual impact. As an example, a pale grey green colour can be used when close to woodland. • When feasible, permanent perimeter fencing will be positioned so that it is screened behind proposed planting. • Permanent lighting required for the operation phase will be designed to minimise glare and light spillage off-site, whilst being consistent with the of site safety and security. Directional lighting will

Type of measure	Detail
	be used where possible, rather than lighting on tall columns. Special attention will be paid to residential properties close to the site. • Post construction site visits will take place, to assess restoration and vegetation screening planning and implementation. Further follow up site visits after two years will take place to assess effectiveness of the visual screening, and to sign off on the rehabilitation and restoration phases. Long term management of the proposed mitigation planting should be considered by Scheme sponsor. • The design of the park will avoid permanent occupation of wetland habitats. The scheme will retain ecological integrity by avoiding and minimising unnecessary vegetation losses.

10.4.6 Residual Effects

Residual effects are those that remain after mitigation and/or enhancement measures have been implemented. A summary of effects after application of mitigation and/or enhancement measures is presented in Table 10.16.

Due to the large scale of the Scheme, there are very few practical options available for mitigation during the construction and operation phase. However, due to the limit viewshed of the project scheme, it is considered that the addition of vegetation screening and perimetric fencing will limit visibility of the scheme from nearby areas.

In order to evaluate visual effects on the Namanve wetland (where there are not permanent visual receptors at the moment), visual effects on potential visitors to the area have been included in the residual effects table.

Table 10.16: Residual effects on landscape and visual receptors – post mitigation

Receptor	Summary of Impact	Adverse/ Beneficial	Temporary/ Permanent	Impact Magnitude	Receptor Sensitivity	Effect Evaluation	Significance of Effect
Construction Phase							
Representative views from urban viewpoints (Nantabulirwa and N. ward village	Change in tranquillity of the landscape character due to temporary presence of HGV movements and earthworks	Adverse	Temporary	Minor	Low	Minor adverse	Not significant
Representative views from Settled-cultivated land viewpoints (Namilyango-Kiseni and Namilyango village)	Change in tranquillity of the landscape character due to temporary presence of HGV movements and earthworks	Adverse	Temporary	Minor	Medium	Moderate adverse	Significant
Visitors to the Namanve wetland	Removal of the reminder of wetland vegetation and increase of anthropization of a natural area	Adverse	Temporary	Minor	High	Moderate adverse	Significant
Operational Phase							
Representative views from urban viewpoints (Nantabulirwa and N. ward village	Change in tranquillity of the landscape character due to significant HGV movements and high density of new business and industrial units.	Adverse	Permanent	Minor	Moderate	Minor adverse	Not significant
Representative views from Settled-cultivated land viewpoints (Namilyango-Kiseni and Namilyango village)	Change in tranquillity of the landscape character due to significant HGV movements and high density of new business and industrial units.	Adverse	Permanent	Minor	Low	Moderate adverse	Significant
Visitors to the Namanve wetland	Removal of the reminder of wetland vegetation and increase of anthropization of a natural area	Adverse	Permanent	Minor	High	Moderate adverse	Significant

11. Noise and Vibration

11.1 Introduction

11.1.1 Overview

This chapter considers the potential noise and vibration effects associated with the construction and operation of the infrastructure associated with the KIBP in accordance with Equator Principles, IFC guidelines and Ugandan national standards.

This assessment describes the methodology used to assess noise and vibration, identifies the Area of Influence, its baseline and the sensitive receptors within it, and presents an assessment of the potential impacts to identify where significant effects are expected to arise.

11.1.2 Study Area and Area of Influence

The AoI for noise impacts due to the Scheme, for the purpose of identifying significant adverse effects, includes all areas where the noise criteria, as set out in Table 11.4 and Table 11.5, have the potential to be exceeded as a result of the Scheme. Furthermore, if the Scheme is predicted to result in reductions in ambient noise corresponding with significant beneficial effects (e.g. by the redirection of road traffic) this would also extend the area of influence.

The construction method statement states that if excavations require the removal of large rocks then the use of a breaker or blasting may be required. As it is uncertain where this would be required, the potential noise impacts have not been assessed quantitively. The noise impacts works are expected to be mitigated by:

- Keeping the works to a short duration and during the daytime period;
- Introducing enhanced mitigation such as localised screening if feasible; and
- Providing prior notice to the occupiers of any receptor who may be affected.

11.2 Methodology

11.2.1 Applicable Guidelines and Standards

11.2.1.1 IFC World Bank Group Environmental, Health and Safety Guidelines

Section 1.7 of the IFC / World Bank Group General Environmental, Health and Safety (EHS) Guidelines applies to “impacts of noise beyond the property boundary of the facilities”. It states that: “*Noise impacts should not exceed the levels presented in Table 1.7.1, or result in a maximum increase in background levels of 3dB at the nearest receptor location off site*.”

Table 1.7.1 of the Guidelines is reproduced in below. It should be noted that, in practice, many institutional and educational receptors would not normally be used during the night period.

Table 11.1: Noise level guidelines given in the IFC World Bank Group EHS Guidelines Table 1.7.1

Receptor	One hour L_{Aeq} dB Daytime 07:00 – 22:00	One hour L_{Aeq} dB Night-time 22:00 – 07:00
Residential, institutional, educational	55	45
Industrial, commercial	70	70

Source: Section 1.7 Noise of the IFC / World Bank Group General EHS Environmental Guidelines

It is not stated whether the application of the Guidelines is for specific phases of a project (i.e. construction and operation) or apply generally. Table 1.7.1 references the World Health Organization 'Guidelines for Community Noise' where the:

- Critical health effect of serious annoyance during the daytime and evening corresponds with the guideline value of 55 dB L_{Aeq} in outdoor living areas;
- Critical health effect of sleep disturbance during the night-time corresponds with the guideline value of 45 dB L_{Aeq} outside bedrooms; and
- Critical health effect of hearing impairment at any time of day corresponds with the guideline value of 70 dB L_{Aeq} in industrial, commercial shopping and traffic areas both indoors and outdoors.

The Guidelines state: "*A point of reception or receptor may be defined as any point on the premises occupied by where extraneous noise and/or vibration are received. Examples of receptor locations may include: permanent or seasonal residences; hotels / motels; schools and daycares; hospitals and nursing homes; places of worship; and parks and campgrounds*."

The EHS Guidelines describe basic requirements for noise monitoring including:

- Noise monitoring programs should be designed and conducted by trained specialists; and
- Noise monitoring should be located approximately 1.5m above the ground and no closer than 3m to any reflecting surface (e.g. wall).

Clause 7 of the IFC Performance Standard 1 states:

"*When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, a full and detailed justification for any proposed alternatives is needed as part of the site-specific environmental assessment. This justification should demonstrate that the choice for any alternative performance level is protective of human health and the environment*."

11.2.1.2 Ugandan Noise Standards and Control Regulations

The National Environmental Management Authority (NEMA)

The permissible noise limits for general environmental noise are reproduced in Table 11.2. It should be noted that, in practice, many institutional and educational receptors would not normally be used during the night period.

Table 11.2: Maximum permissible noise levels for general environment

Facility	Noise Limits dB(A) Leq Day 06:00 – 22:00	Noise Limits dB(A) Leq Night 22:00 – 06:00
A. Any building used as hospital, convalescence home, home for the aged, sanatorium and institutes of higher learning, conference rooms, public library, environmental or recreational sites.	45	35
B. Residential buildings	50	35
C. Mixed residential (with some commercial and entertainment)	55	45
D. Residential + industry or small-scale production + commerce	60	50
E. Industrial	70	60

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

The permissible noise limits for construction noise are reproduced in Table 11.3.

Table 11.3: Maximum permissible noise levels for construction site

Facility	Noise Limits dB(A) Leq Day 06:00 – 22:00	Noise Limits dB(A) Leq Night 22:00 – 06:00
Residential	60	40
Commercial	75	70
Industrial	85	65

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

11.2.2 Field Surveys

Baseline noise surveys were undertaken in May 2019 by Queensland & Leeds Ltd in accordance with the requirements given in the IFC World Bank Group General Environmental, Health and Safety Guidelines Section 1.7 'Noise' and procedures of ISO 1996 'Acoustics – Description, measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedures' (2016). The results of the survey are presented in Table 11.12.

11.2.3 Determining Magnitude, Sensitivity, and Impact Significance

11.2.3.1 Construction

Table 11.4 compares the IFC Noise Level Guidelines and Ugandan Regulations for construction noise and indicates the criteria that have been selected for the assessment of noise impacts arising during the construction phase of the Scheme.

Table 11.4: Selection of criteria for the assessment of noise during construction

Type of receptor	Daytime			Night		
	Ugandan Regulations	IFC	Selected Criterion	Ugandan Regulations	IFC	Selected Criterion
Hospital	–	55*	55	–	45*	45
Convalescence Home	–	55*	55	–	45*	45
Home for the aged	–	55†	60	–	45†	40
Sanatorium	–	55*	55	–	45*	45
Institutes of Higher learning	–	55µ	55	–	45µ	45
Conference rooms	–	–	60	–	–	45
Public library	–	55*	60	–	45*	45
Environmental or recreational sites	–	–	60	–	–	45
Residential buildings	60	55	60	40	45	40
Mixed residential with some commercial and entertainment	–	–	60	–	–	40
Residential and industry or small-scale production and commerce	–	–	60	–	–	40
Industrial	85	70	70	65	70	65
Commercial	75	70	70	70	70	70
Place of worship	–	55*	55	–	45*	45
School	–	55µ	55	–	45µ	45

* Considered to be an 'institutional' receptor, † Considered to a 'residential' receptor, µ Considered to be an 'educational' receptor

Despite Clause 7 of the IFC PS1, the selected criteria for the assessment of daytime construction noise due to the Scheme have mainly been adopted based on the permissible

limits on construction noise given in the Ugandan Regulations, which are less stringent than the IFC Noise Level Guidelines for daytime, on the basis that:

- The Ugandan Regulations make specific provision for construction noise impacts whereas the IFC Guidelines apply to more general environmental impacts; and
- Noise impacts due to construction noise are more likely to be tolerated compared to general, long-term sources of noise when it is known that activities are of short or limited duration and are expected to result in benefits to the community in the long term.

However, in the case of construction noise impacts at night, the most stringent criterion is selected.

It is noted that the day and night periods are defined differently by the Ugandan Regulations (06:00 to 22:00 and 22:00 to 06:00 respectively) and the IFC / World Bank Group EHS Guidelines (07:00 to 22:00 and 22:00 to 07:00) respectively. The definition of day and night-time given in Ugandan Regulations is adopted for this assessment to account for technological, social, economic, political and other factors specific for the country.

11.2.3.2 Operation

Table 11.5 compares the IFC Noise Level Guidelines and Ugandan Regulations for general environmental noise and indicates the criteria that have been selected for the assessment of noise impacts during the operational phase of the Scheme.

Table 11.5: Selection of criteria for the assessment of operational noise

Type of receptor	Daytime			Night		
	Ugandan Regulations	IFC	Selected Criterion	Ugandan Regulations	IFC	Selected Criterion
Hospital	45	55*	45	35	45*	35
Convalescence Home	45	55*	45	35	45*	35
Home for the aged	45	55†	45	35	45†	35
Sanatorium	45	55*	45	35	45*	35
Institutes of Higher learning	45	55µ	45	35	45µ	35
Conference rooms	45	–	45	35	–	35
Public library	45	55*	45	35	45*	35
Environmental or recreational sites	45	–	45	35	–	35
Residential buildings	50	55	50	35	45	35
Mixed residential with some commercial and entertainment	55	–	55	45	–	45
Residential and industry or small-scale production and commerce	60	–	60	50	–	50
Industrial	70	70	70	60	70	60
Commercial	–	70	70	–	70	70
Place of worship	–	55*	55	–	45*	45
School	–	55µ	55	–	45µ	45

* Considered to be an ‘institutional’ receptor, † Considered to a ‘residential’ receptor, µ Considered to be an ‘educational’ receptor

The definition of day and night time as given in the Ugandan Regulations is adopted for the assessment for the reasons given above.

The sensitivity of receptor is accounted for by applying different criteria for the received noise impact as shown in the tables above. Therefore, it is not appropriate to assign sensitivity and

apply the significance matrix to determine significance of effect. Therefore, Table 11.6 describes the approach taken to identify significance of effect.

Table 11.6: The identification of significant effects due to noise impacts of the Scheme

Scheme noise level	Change in ambient	Significance of effect	Significant
Below the criterion	Decrease 10 dB or more	Major beneficial	Yes
	Decrease 3 dB to 10 dB	Moderate beneficial	
	Decrease less than 3 dB	Minor beneficial	No
	Any increase	Negligible	
Equals or exceeds the criterion	Change of less than 3 dB increase	Minor adverse	
	Increase 3 dB to 10 dB	Moderate adverse	Yes
	Increase 10 dB or more	Major adverse	

11.2.4 Limitations and Assumptions

11.2.4.1 Construction

Calculations of construction noise have been undertaken using guidance and methodology from the British Standard BS 5228 'Code of Practice for Noise and Vibration Control on Construction and Open Sites' (2014)[19].

Typical construction plant and activities have been reviewed from the Method Statement[20] for use within outline noise level calculations. The main construction works that are expected to be undertaken are described in the Method Statement and are summarised as follows for both construction of roads, water services, electrical works and general civils works:

- Site clearance and establishment
- Culverts
- Excavation/groundworks
- Movement of spoil and fill materials
- Drainage works
- Concrete batching
- Road construction
- Foundations
- Structures and buildings
- Water and sewage earthworks
- Pipework for mains water
- Electrical works, cable laying and substation installation

Noise levels for construction plant have been extracted from Annex C of BS 5228 Part 1 which includes a database of equivalent continuous noise levels ($L_{Aeq,T}$ dB) generated by a range of fixed and mobile plant used for typical construction activities. Table 11.7 summarises selected plant source noise levels used within calculations. The number of plant items and utilisation (%on-times) for each activity have been based on similar construction activities and professional judgement with respect to the proposed works.

[19] British Standard (BS) 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise'
[20] Lagan/DOTT Joint Venture. Kampala Industrial and Business Park, Namanve. Form C4.1.10 Method Statement.

Table 11.7: Construction plant noise levels

Plant description	BS 5228-1 Reference and description	Noise level at 10m, dB $L_{Aeq,T}$
Bulldozers	C2.10 Dozer	80
Excavators	C2.14 Tracked Excavator	79
Front wheel loaders	C2.27 Wheeled loader	80
Motor graders	D.3 76 Grader	83
Compacting equipment/rollers	C.5 20 Vibratory roller 8.9t	75
Heavy tippers	C6.27 Articulated dump truck	76
Crusher	C1.14 Tracked Crusher	82
Dump trucks	C2.30 Dump truck	79
Batching plant	C4.22 Large concrete mixer	76
Concrete dumper	C4.5 Dumper	63
Mobile crane	C4.38 Wheeled mobile telescopic crane	78
Asphalt concrete paver	C5.31 Asphalt paver and tipper lorry	77
Water pump	C4.88 Diesel water pump	68
Telescopic handler	C2.35 Telescopic handler	71
Disc cutter	C4.73 Handheld circular saw	84
Poker vibrator for concrete	C4.33 Poker vibrator	78

Source: Mott MacDonald

The location of plant is assumed to be within indicated areas relating to each task or activity. Calculations assume benefit of partial acoustic screening from site boundary hoarding or temporary construction acoustic barrier for all activities.

It is assumed works would primarily occur during daytime periods. It is understood that a limited amount of construction activities may be required subject to final programme of works and requirements of specific tasks.

Information relating to construction traffic movements has been derived for supplied information. Construction works would increase traffic movements in the short-term and hence a temporary increase in noise levels would be observed. Traffic flow values assumed within construction traffic noise calculations is shown in Table 11.8.

Table 11.8: Construction traffic assumptions for noise calculations

	2019 without construction			2019 with construction		
Road	**AADT two-way flow**	**%HGV**	**Speed km/h**	**AADT two-way flow**	**%HGV**	**Speed km/h**
Jinja Highway	17783	19.9	40	18144	20.6	40
Old Jinja Road	9400	15.5	30	9555	16.1	30

Source: Mott MacDonald

11.2.4.2 Operation

Road traffic noise levels for relevant sections of road affected by implementation of the scheme have been calculated using methodology and guidance from the Calculation of Road Traffic Noise (CRTN)[21].

[21] Calculation of Road Traffic Noise (CRTN) 1988

Annual Average Daytime Traffic (AADT) flow data has been reviewed and analysed for the purposes of determining noise level changes on main access into the development site during operation. AADT values have been used and are considered representative for the purposes of this assessment in determining noise level changes. Traffic values assumed within calculations are shown below in Table 11.9.

Table 11.9: Operational traffic assumptions for noise calculations

	2032 without KIBP			2032 with KIBP		
Road	AADT two-way flow	%HGV	Speed km/h	AADT two-way flow	%HGV	Speed km/h
Jinja Highway	20000	19.9	40	24319	29.3	40
Old Jinja Road	10572	15.5	30	12423	24.1	30

Source: Mott MacDonald

Information relating to operational noise levels from fixed plant including the proposed sewage treatment works and electrical substations is not available at this stage. Reference noise levels have been selected from similar plant types for the purposes of assessing noise impacts from these items. A noise model has been developed using DataKustik CadnaA acoustic modelling software to calculate noise levels from proposed fixed plant using the methodology of ISO 9613-2[22]. The model includes some existing buildings incorporated from GIS information but otherwise unobstructed propagation, global ground absorption G=0.5 and a receptor height of 1.5m above local grade level. Source noise levels included within calculations are described below in Table 11.10.

Table 11.10: Fixed plant noise levels

Plant item	Sound power level per single octave frequency band, Hz (dB)									Lw dBA
	31.5	63	125	250	500	1k	2k	4k	8k	
Solid Waste Treatment Plant (Total combined sources)	99	105	99	101	97	96	94	89	85	101
Sewage Treatment Plant (Total combined sources)	96	105	108	105	101	101	102	97	92	107
Substation (external unit nominal rating 110kV)	74	83	88	87	87	81	76	71	64	87

Source: Mott MacDonald

11.3 Baseline

A baseline noise survey was undertaken in May 2019 by Air Earth Water (AWE) Ltd Consultants. This comprised six measurement positions with attended noise measurements made over one-hour intervals at various times during the weekday daytime period on different days of the week. It was not possible to undertake measurements during the night-time due to health and safety hazards. The positions are described in Table 11.11 and indicated in Figure 11.1.

Table 11.11: Baseline noise measurement positions of the May 2019 survey

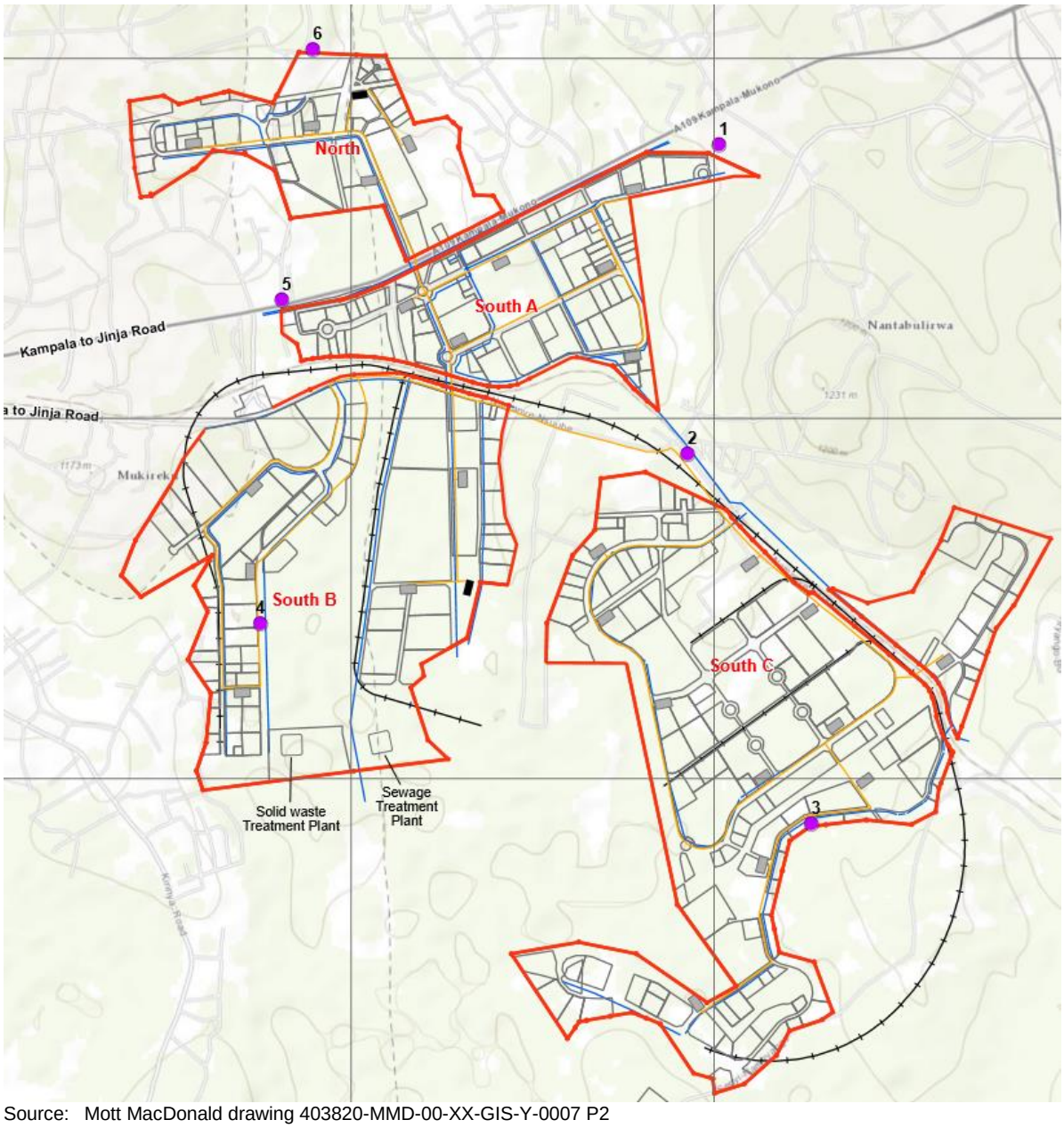
Position	GPS co-ordinates*	Description
1	464301N, 37640E	Boundary of residential area and South A site close to the Kampala to Jinja Road

[22] ISO 9613-2 - Attenuation of sound during propagation outdoors - Part 2: General method of calculation

Position	GPS co-ordinates*	Description
2	467117N, 36616E	Residential area close to St Peter's Primary School between South A and South C sites
3	464568N, 40578E	Residential area adjacent to the southern boundary of the South C site
4	466484N, 38508E	Close to the boundary between South B site and the Namataba area to the west
5	464410N, 39296E	Residential, commercial and light industrial area adjacent to the Kampala to Jinja Road at the western boundary of the South A site
6	466644N, 40091E	Boundary of the North site and the Butto area to the north

*UTM 36N WGS1984

Figure 11.1: Plan indicating the baseline noise measurement positions of the May 2019 survey



Source: Mott MacDonald drawing 403820-MMD-00-XX-GIS-Y-0007 P2

The main sources of noise within the study area were identified as:

- Road traffic
- Construction and light industrial activities;
- Occasional rail movements on the Mombasa-Kampala railway;
- Pedestrians, animals and birdsong; and
- A church public address system.

Table 11.12 presents a summary of the measured baseline noise levels.

Table 11.12: Summary of the results of the baseline noise survey

Position	Start time	L_{Aeq} dB	L_{A90} dB	$L_{A(max)F}$ dB	Comment
1 (464301N, 37640E)	10:06	51.0	42.0	68.6	Distant church public address system. Steel fabrication activity. Chirping birds. Rustling leaves
	11:50	43.7	37.0	62.9	Chirping birds. Rustling leaves. Aircraft overhead.
	13:38	56.4	46.0	72.9	Steel fabrication activity. Chirping birds. Rustling leaves
	15:27	51.3	41.5	83.9	Distant steel fabrication activity. Chirping birds. Rustling leaves. Distant church public address system. Playing dogs.
	15:29	56.4	43.5	87.9	Chirping birds. Distant church public address system. Distant construction activity.
2 (467117N, 36616E)	09:14	48.0	41.0	70.2	Distant vehicular traffic. Birdsong. Aircraft overhead. Croaking frogs. Pedestrian conversations.
	11:29	52.9	37.0	77.5	Distant vehicular traffic. Birdsong. Pedestrian conversations. Rustling leaves.
	11:39	49.8	36.0	76.0	Distant vehicular traffic. Birdsong. Pedestrian conversations.
	13:14	53.1	33.5	78.2	Distant vehicular traffic. Birdsong. Pedestrian conversations.
	16:48	46.3	37.0	68.8	Distant vehicular traffic. Birdsong.
3 (464568N, 40578E)	08:52	51.3	45.5	72.2	Pedestrian conversations. Birdsong. Vehicular traffic.
	12:49	52.5	44.5	75.6	Playing children. Birdsong. Distant vehicular traffic.
	14:06	54.5	45.5	78.5	Pedestrian conversations. Birdsong. Distant vehicular traffic. Playing children.
	16:02	55.8	45.5	76.6	Pedestrian conversations. Birdsong. Vehicular traffic.
	18:54	52.1	44.5	78.2	Pedestrian conversations. Birdsong. Distant vehicular traffic.
4 (466484N, 38508E)	10:17	66.3	50.5	88.2	Vehicular traffic. Pedestrian conversations. Birdsong.
	10:33	67.5	55.0	95.6	Vehicular traffic. Pedestrian conversations. Locomotive engine.
	12:59	69.2	53.5	93.0	Vehicular traffic. Pedestrian conversations
	14:29	68.0	50.0	98.7	Vehicular traffic. Pedestrian conversations. Truck repair activity.
	15:30	67.8	55.0	92.7	Vehicular traffic. Pedestrian conversation.
5 (464410N, 39296E)	11:34	67.1	63.5	87.0	Highway traffic. Distant public address system. Distant construction activity. Human conversations.
	12:55	65.4	59.5	90.1	Highway traffic. Pedestrian conversations. Birdsong. Distant construction noise.

Position	Start time	L_{Aeq} dB	L_{A90} dB	$L_{A(max)F}$ dB	Comment
	14:13	65.0	61.0	89.3	Highway traffic. Distant construction activity. Pedestrian conversations. Birdsong.
	14:51	66.6	62.5	89.9	Highway traffic. Distant construction activity. Pedestrian conversations.
	17:23	64.4	60.0	88.5	Highway traffic. Pedestrian conversations. Birdsong.
6 (466644N, 40091E)	08:55	50.0	42.5	77.6	Distant vehicular traffic. Pedestrian conversations. Birdsong. Distant construction activity.
	10:10	49.6	46.5	71.3	Distant vehicular traffic. Pedestrian conversations.
	11:50	55.6	47.0	89.6	Vehicular traffic. Birdsong. Pedestrian conversations.
	14:12	48.7	42.5	80.8	Distant highway traffic. Birdsong. Pedestrian conversations.
	15:49	53.4	42.5	88.3	Distant vehicular traffic. Pedestrian conversations. Birdsong. Distant construction activity.

Source: AWE Ltd Consultants

11.4 Assessment of Effects

11.4.1 Introduction

This section presents the assessment of the effects due to the potential noise and vibration impacts that are expected to arise during the construction and operation phases of the Scheme.

Noise and vibration impacts are expected to arise during construction due to:

- The use of mechanised construction plant for the excavation and preparation of the ground for new buildings and roads, the modification of existing roads and the movement and handling of materials and equipment used in constructing buildings and infrastructure (roads and the railway);
- The movement of road traffic for the delivery and removal of materials and equipment to and from the Scheme sites.

Noise impacts are expected to arise during operation due to

- The movement of road and rail traffic accessing the Scheme site;
- Changes in road traffic on public highways; and
- Noise from the operation of fixed plant associated with Scheme elements such as wastewater treatment and power distribution
- New businesses of the Scheme site may also generate noise although this outside the scope of the ESIA.

The Scheme is located within an area where there are receptors that are potentially sensitive to noise and vibration including:

- Residential properties;
- Places of worship;
- Existing industrial and commercial properties;

The KIBP may also introduce receptors that are sensitive to noise and vibration (e.g. radio or TV broadcasting studios may be sensitive to noise, or precision manufacturing may be sensitive to vibration) although this is outside the scope of the ESIA.

11.4.2 Construction Impacts

11.4.2.1 Impacts during construction – construction works predicted noise levels

The main construction works have been grouped into four sub-groups which spatially represent where construction activities are anticipated to occur with each aspect of the works.

Calculations have been completed for each phase or activity described above based on assumptions described in Section 11.2.4. Results for each phase are summarised in Table 11.13. The resultant noise level at 10m is presented for each identified activity. Calculation results present the indicative distance from relevant activities to the noise limit boundary for construction activities for day and night-time works respectively for residential receptors.

Grey shaded rows represent the highest predicted noise levels per sub-group.

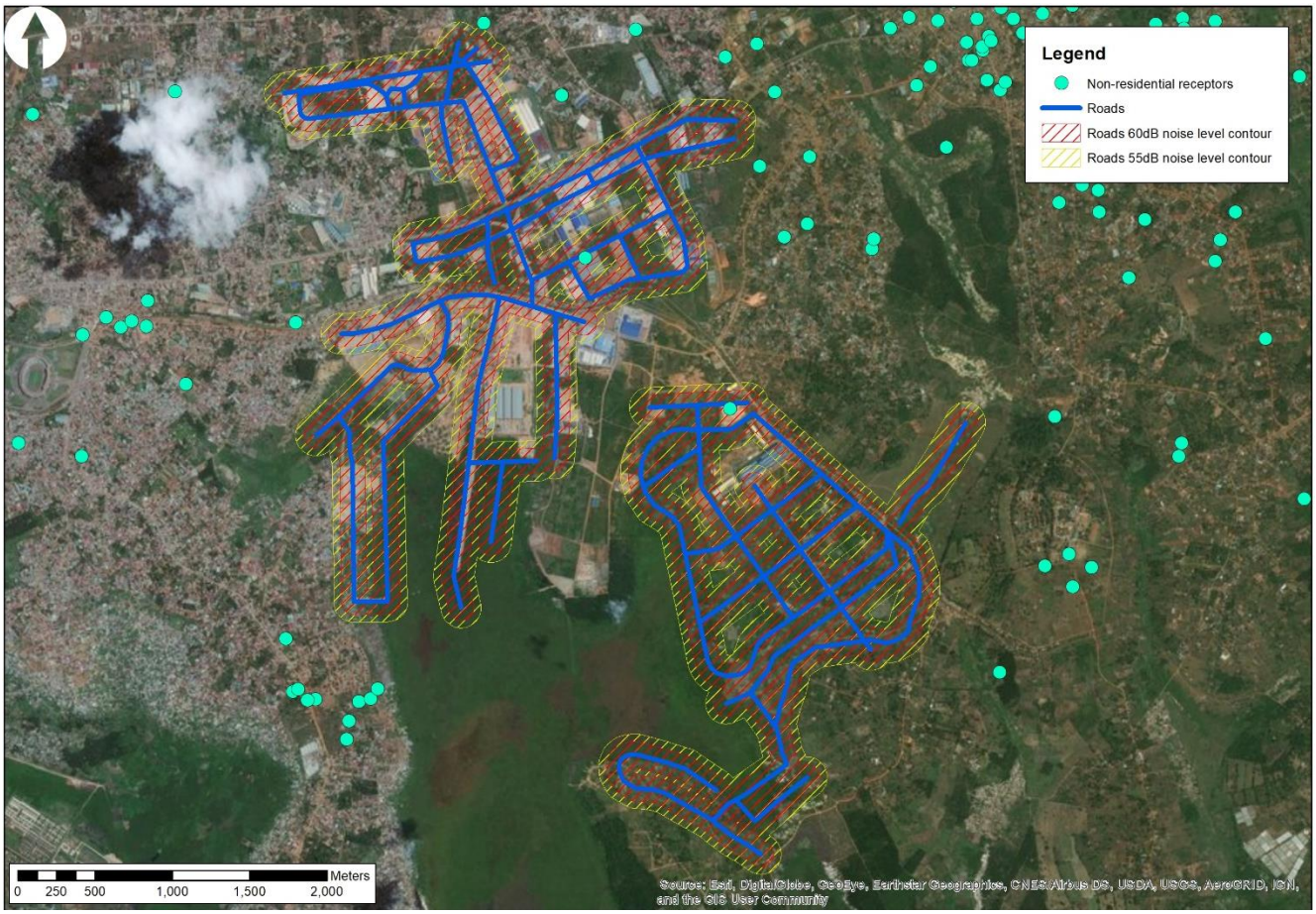
Table 11.13: Predicted construction noise levels

Sub-group and activity	Resultant noise level, $L_{Aeq,T}$ dB at 10m	Distance to noise limit boundary for residential receptors	
		Daytime (60dB $L_{Aeq,T}$ noise limit), m	Night-time (40dB $L_{Aeq,T}$ noise limit), m
Roads - Clearing and grubbing	81	83	523
Roads - Removal of topsoil	80	75	471
Roads - Removal of existing structures	73	39	245
Roads - Drainage and structural works	79	67	421
Roads - Earthworks	79	71	446
Roads - Crushed aggregate base course	79	68	432
Roads - Culverts	81	83	523
Roads - Excavation/groundworks	80	78	495
Roads - Movement of spoil and fill materials	78	64	406
Roads - Drainage and structural works	79	67	421
Roads - Concrete batching	74	42	265
Roads - Construction/paving	73	39	248
Water and Sewage - Earthworks	75	49	310
Water and Sewage – Pipework, transporting and cutting	78	62	393
Civils - Foundations	81	82	515
Civils - Structures and buildings	75	47	295
Civils - Borrow pits	79	67	421
Electrical - Cable laying	75	50	315

Source: Mott MacDonald

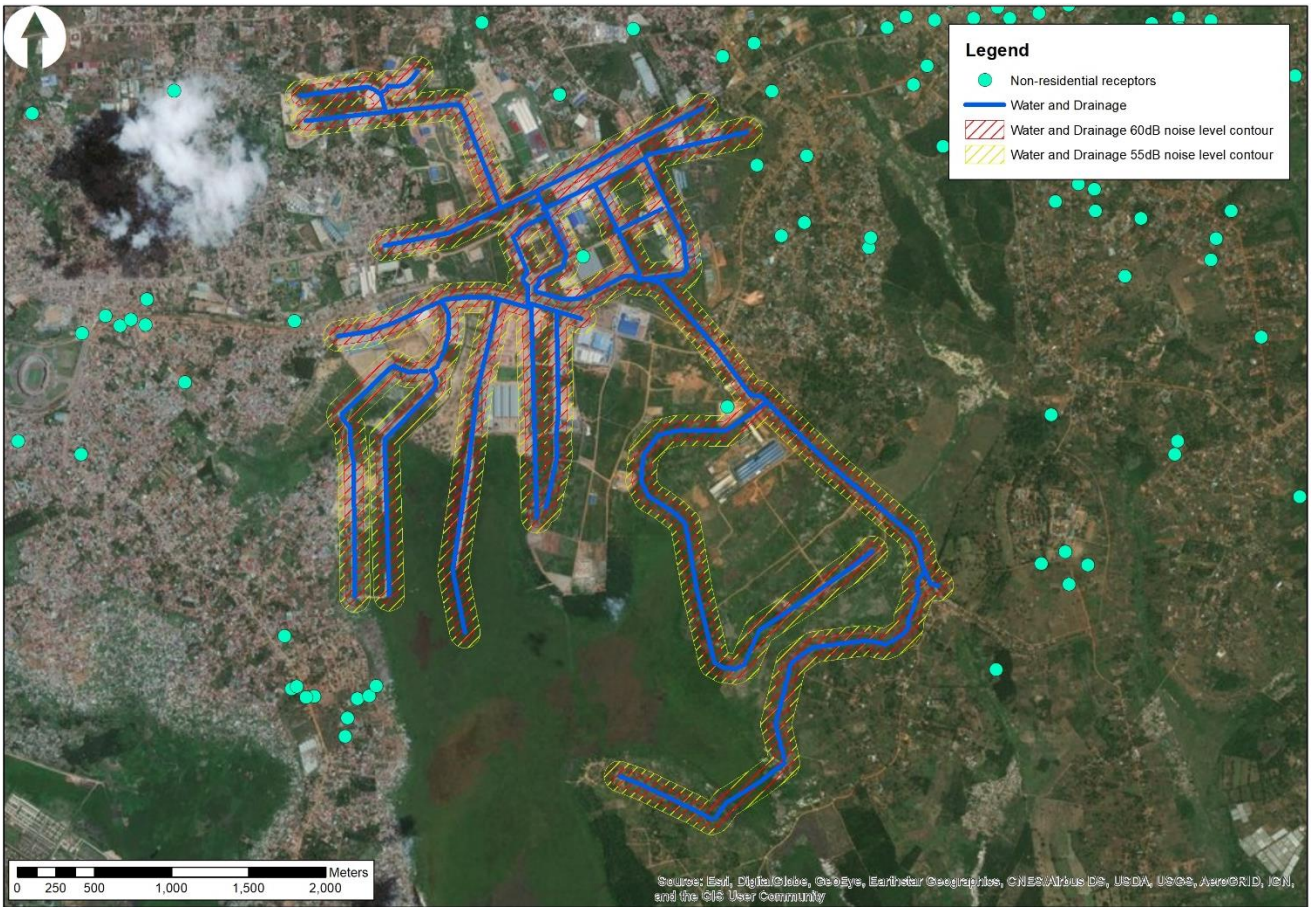
The highest activity noise levels per sub-group are shown graphically against anticipated areas of sub-group activities to indicate areas which exceed the daytime noise limit threshold for residential receptors (represented by a 60dB noise level contour) and non-residential noise sensitive receptors (represented by a 55dB noise level contour). These results are shown in Figure 11.2 to Figure 11.5.

Figure 11.2: Construction noise impacts – Roads



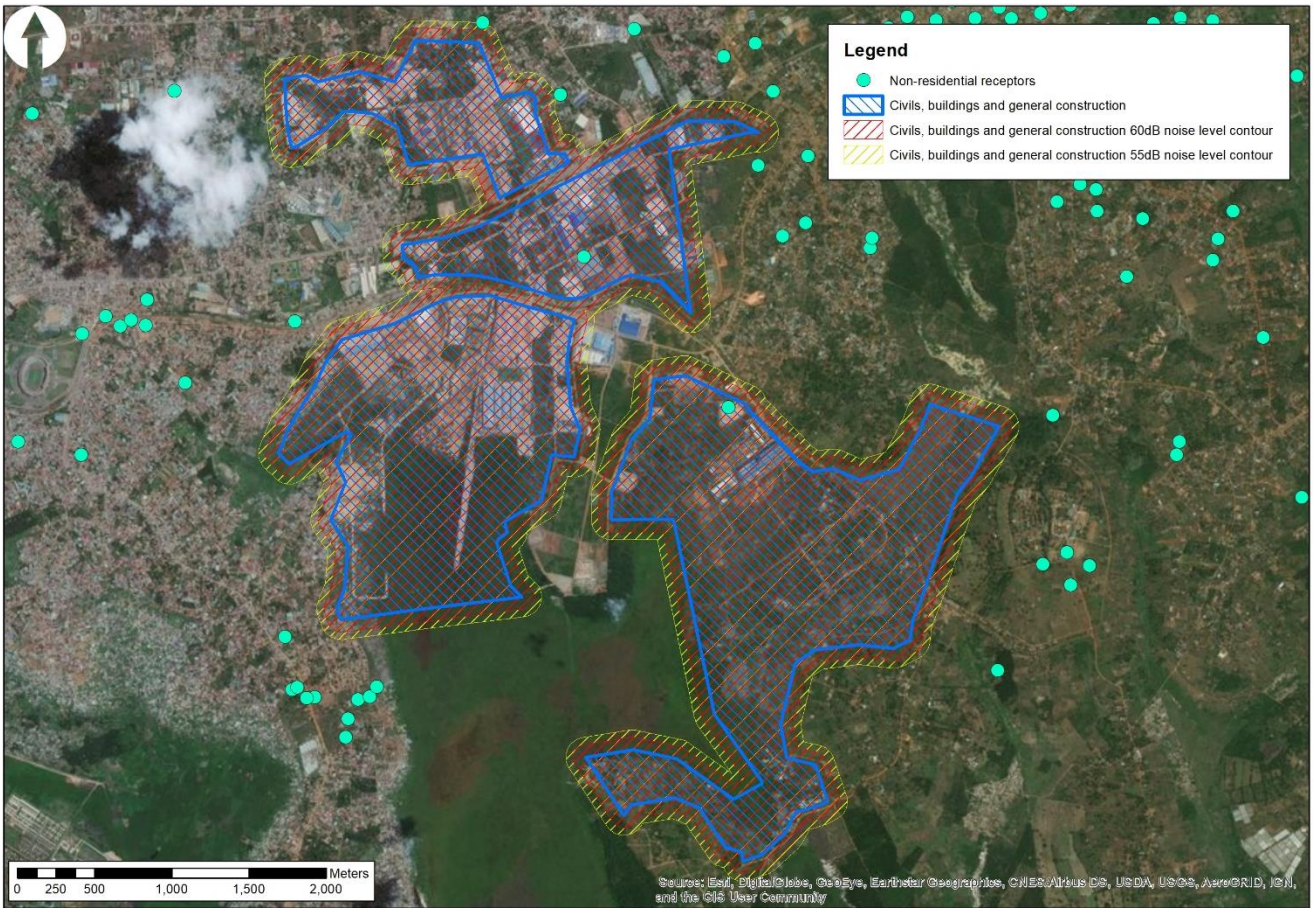
Source: Mott MacDonald

Figure 11.3: Construction noise impacts - water and drainage



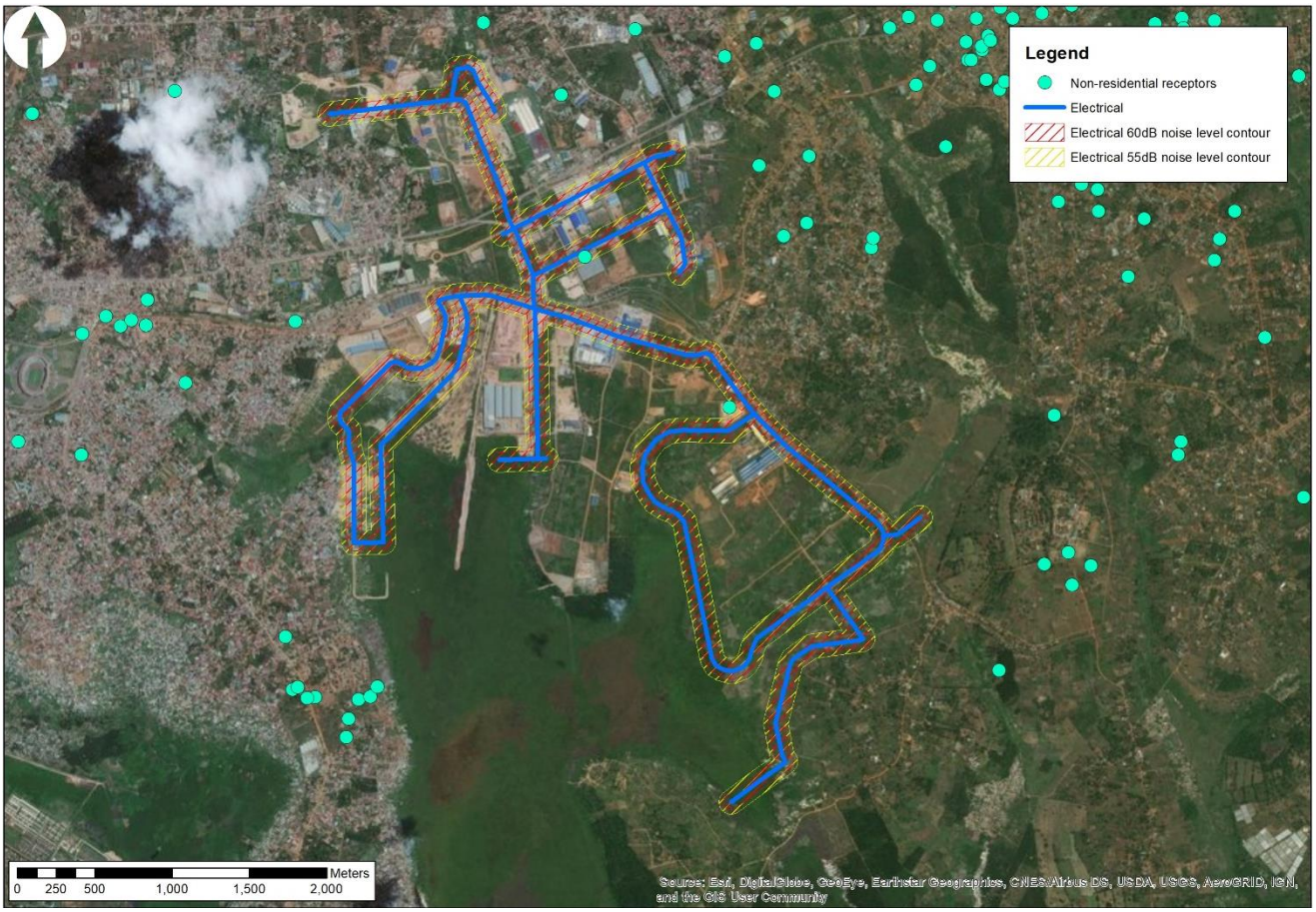
Source: Mott MacDonald

Figure 11.4: Construction noise impacts - civils, buildings and general construction



Source: Mott MacDonald

Figure 11.5: Construction noise impacts - electrical



Source: Mott MacDonald

11.4.2.2 Impacts during construction – significance of daytime effects

Figure 11.2 to Figure 11.5 show that several areas of existing residential receptors will fall within the 60dB $L_{Aeq,T}$ noise level boundary during the highest noise level activities. Receptors will be most affected when activities are in close proximity to the construction site boundary. Civils works which may include a wide range of activities over large areas of the site has the potential to affect most existing residential receptors dependant on the specific location of activities at any one time. Impacts associated with linear works (e.g. pipe laying, electrical cable laying, some road work activities) are likely to be more focussed around specific site locations and therefore the potential noise impact footprint does not extend into existing noise sensitive areas.

Assessment of construction noise levels against baseline noise levels show that for receptors within approximately 80m of construction activities, daytime ambient noise levels will increase by between 0.5 and 10dB. The most affected residential receptors are those located in quieter areas away from roads and existing noise sources or those located in close proximity to proposed construction activities. Baseline noise measurements indicate areas which present quieter existing ambient noise levels include areas north of the North KIBP boundary (survey location 6) and the eastern scheme boundaries (survey locations 1,2, and 3). Construction noise at receptors within the 60dB boundary at these locations have the potential to result in a moderate or major adverse impact which are assessed to be significant adverse.

Whilst the existing ambient noise level is higher in areas along the existing main roads through the development site, construction works which occur within approximately 30m of existing receptors may result also in moderate or major adverse increases due to the close proximity of works to receptors, which are assessed to be significant adverse effects.

For all other residential receptors, which are located greater than approximately 80m from construction works in quieter areas or greater than 30m from construction works and in existing high ambient noise level environments, ambient noise levels may increase due to construction activities, however are assessed to be not significant.

11.4.2.3 Impacts during construction – night-time works

Construction activities are not anticipated to occur during night-time periods. However, subject to the construction programme and specific requirement where night-time activities occur noise from works has the potential to exceed the respective threshold criteria for a considerably larger number of sensitive receptors compared to daytime periods (as indicated by results shown in Table 11.13).

Night-time construction works would result in potential significant adverse effects for residential receptors within an area up to approximately 500m (subject to the type of works and specific location of activities in addition to existing ambient noise levels). Mitigation must therefore be implemented to minimise potential noise impact during night-time periods including limiting the number of nights where works are undertaken within a certain period and programming only quieter works during night-time periods.

11.4.2.4 Impacts during construction – non-residential receptors

Non-residential noise sensitive receptors surrounding the KIBP site include places of worship, hospitals, schools, and existing commercial and industrial properties. These receptor types have a minimum daytime noise limit criteria of 55 dB $L_{Aeq,T}$ for noise from construction works. Figure 11.2 to Figure 11.5 show two non-residential sensitive receptors which fall within the daytime noise limit boundary including St Peter's Primary School at Koolo-Buwanyi and a commercial premise. Noise impact at these two receptors, and any other receptors within the development site boundary, has the potential to be moderate or major adverse during construction which is assessed to be a significant adverse effect.

Existing commercial and industrial units at the site have the potential also to be exposed to high levels of construction noise depending on the final construction programme and specific location of works. It is recommended further review should be undertaken following receipt of detailed construction programme to determine noise impact and design appropriate mitigation measures for these and any significantly adversely affected noise sensitive receptors.

11.4.2.5 Impacts during construction – construction traffic

Road traffic noise levels have been calculated based on assumptions described in Section 11.2.4. Noise level calculation and assessment results are presented in the table below.

Table 11.14: Predicted construction traffic noise levels

Road	2019 without construction BNL, dB	2019 with construction BNL, dB	Change in noise level, dB	Results
Jinja Highway	73.1	73.3	0.2	Negligible or Minor adverse
Old Jinja Road	69.5	69.7	0.2	Negligible or Minor adverse

Source: Mott MacDonald

Results show that relative noise level increases due to construction related traffic using existing highways will result in negligible or minor adverse impacts which are assessed to be not significant. Relative noise level changes may occur on other highways which have not been considered within the scope of this assessment and which result in a higher level of adverse impact.

11.4.3 Operation Impacts

11.4.3.1 Impacts during operation – road and rail traffic noise sources

Reference road traffic noise levels (L_{A10} dB) have been calculated using CRTN based on assumptions described in Section 11.2.4. Noise level calculation and assessment results are presented in the table below.

Table 11.15: Predicted road traffic noise levels

Road	2032 without scheme dB(A)	2032 with scheme dB(A)	Change in noise level dB	Results
Jinja Highway	73.6	75.7	2.1	Negligible or Minor adverse
Old Jinja Road	70.0	72.2	2.2	Negligible or Minor adverse

Source: Mott MacDonald

Results show that relative noise level increases due to operational traffic associated with the KIBP will result in negligible or minor adverse impacts which are assessed to be not significant for all receptors.

No information is available at this time to assess noise levels or associated impact from the new railway. It is understood that rail movements would provide a transport route for containerised goods into the KIBP development site. Noise impacts have the potential to have significant adverse effects subject to the design and operation of the railway line. Similarly, relative noise level changes may occur on other highways which have not been considered within the scope of this assessment and which result in a greater degree of adverse effect.

It is not possible to assess the noise impact from operational traffic on local roads or proposed railway with the details available at this stage.

11.4.3.2 Impacts during operation – fixed plant

Long-term, operational noise impacts associated with fixed plant items to be installed on the site may arise from sewage treatment plant and electrical substations, although this is outside the scope of the ESIA.

Mitigation through the provision of appropriately specified attenuation, enclosures or noise barriers is expected to be capable of minimising noise emissions from fixed plant and associated impact noise impact such that the noise limit criteria are not exceeded at any noise sensitive receptors.

11.4.4 Summary of pre-mitigation construction and operation impacts and effects

A summary of the pre-mitigation potential noise and vibration impacts and effects are shown in Table 11.16. Those effects that are moderate, or major are considered significant. This table does not include secondary effects covered in other sections.

Table 11.16: Summary of potential impacts and effects, pre-mitigation

Receptor	Summary of Impact	Adverse/ Beneficial	Temporary/ Permanent	Impact Magnitude	Receptor Sensitivity	Effect Evaluation	Significance of Effect
Construction Phase							
Receptors close to survey locations 1, 2, 3 and 6 up to ~80m around working areas and non-residential receptors within the 55dB contour around working areas Receptors close to survey locations 4 and 5 up to ~30m around working areas	Daytime construction works affecting receptors (worst case)	Adverse	Temporary	Moderate or major	Medium	Moderate or major	Significant
Residential receptors up to 500m from the works	Construction works affecting receptors (worst case)	Adverse	Temporary	Moderate or major	Medium	Moderate or major	Significant
Receptors adjacent to the Jinja Highway and Old Jinja Road	Increase in road traffic noise during construction	Adverse	Temporary	Minor	Medium	Minor	Not significant
Operational Phase							
Receptors adjacent to the Jinja Highway and Old Jinja Road	Increases in road traffic noise	Adverse	Permanent	Minor	Medium	Minor	Not significant

11.4.5 Mitigation Measures

Table 11.17, provides a summary of mitigation and enhancement measures for impacts and effects identified in this section.

Table 11.17: Mitigation and enhancement measures

Type of measure	Detail
Construction	
Embedded mitigation – mitigation which is built in to Scheme during the design and procurement process	Noise impacts from onsite construction works and from construction generated traffic • The layout of the Scheme site shall be designed to maximise on site efficiency and minimise the potential impacts on noise sensitive receptors. Positioning of temporary site compounds as far as reasonably practicable from sensitive receptors. Use of site terrain, material stockpiles and suitable work locations so as to screen work locations and maximise the distance between work activities and receptors. • Use of temporary site hoarding around the construction site perimeter to provide acoustic screening to nearby noise sensitive receptors. • Undertake construction activities in accordance with best practice. • Restrict blasting to daytime. • Restrict access of the general public to the site access road and transmission line construction zone. • Minimising Scheme transportation through community areas. • Ensuring compliance with IFC and BS 5228 noise levels.
Mitigation of significant effects	Noise impacts from onsite construction works and from construction generated related traffic on public and onsite access roads • Preparation of a comprehensive description of measures to mitigate noise and vibration within the Construction Environmental Management Plan including procedures for handling noise and vibration complaints. • Separation of sensitive receptors and haulage routes where possible • Ensuring compliance with IFC and BS 5228 noise levels. • Prioritise noisy activities to be undertaken in the daytime where feasible (i.e. avoid night working). • Undertake construction activities in accordance with best practicable means for the control of noise and vibration.
Mitigation of non-significant effects	Blasting air overpressure affecting nearby receptors during blasting events • Preparation of comprehensive description of measure to mitigate noise and vibration within the Construction Management Plan including procedures for handling noise and vibration complaints.
Enhancement measures	None
Operation	
Embedded mitigation – mitigation which is built in to Scheme during the design and procurement process	Noise impacts from operation of the site and from associated changes in road traffic or transportation network • The layout of the Scheme site shall be designed to minimise the potential impacts on noise sensitive receptors. • Use of site terrain and structures to screen noise sources from receptors. • Ensuring compliance with IFC noise levels.
Mitigation of significant effects	Noise impacts from fixed plant, changes in associated road traffic or transportation network • Design of transportation systems associated with the site operation to minimise potential impacts on noise sensitive receptors. Specification of low noise variants and screening measures to prevent significant adverse effects from new rail and transport systems. • Ensuring compliance with IFC noise levels.
Mitigation of non-significant effects	Noise from associated changes in road traffic or transportation network. • Use of lower noise road surfaces
Enhancement measures	None

11.4.6 Residual Impacts and Effects

Residual effects are those that remain after mitigation and/or enhancement measures have been implemented. A summary of impacts considered to be minor adverse after application of mitigation and/or enhancement measures is presented in Table 11.18.

Table 11.18: Residual impacts and effects noise and vibration impacts after application of mitigation

Receptor	Summary of impact	Temporary/ Permanent	Adverse/ beneficial	Magnitude of Impact	Sensitivity of Receptor	Effect Evaluation	Significance of Effect
Construction							
Receptors close to survey locations 1, 2, 3 and 6 up to ~80m around working areas and non-residential receptors within the 55dB contour around working areas Receptors close to survey locations 4 and 5 up to ~30m around working areas	Daytime construction works affecting receptors	Temporary	Adverse	Minor	Medium	Minor	Not significant
Residential receptors up to 500m from the works	Night-time construction works affecting receptors	Temporary	Adverse	Minor	Medium	Minor	Not significant
Operation							
Receptors adjacent to the Jinja Highway and Old Jinja Road	Increases in noise levels during operation from road traffic	Permanent	Adverse	Minor	Medium	Minor	Not significant

After the application of mitigation measures, construction activities have the potential for significant adverse effects on sensitive noise receptors. These effects are expected to be localised and temporary in nature and it is anticipated that the community will be less sensitive to the noise impacts in the knowledge that the works are short term. Nearby communities may also benefit from upgrading of the local road network and development of the proposed site.

12. Socioeconomic Characteristics

12.1 Introduction

12.1.1 Overview

This section presents a summary of the study area and AoI, survey methodologies, baseline socioeconomic characterisation and impacts and mitigation for the Scheme.

12.1.2 Study Area and Area of Influence

The Scheme has been assessed with reference to the three following AoIs:

- Wider Area of Impact (WAI)
- Local Area of Impact (LAI)
- Direct Impact Area (DIA).

Each is described below.

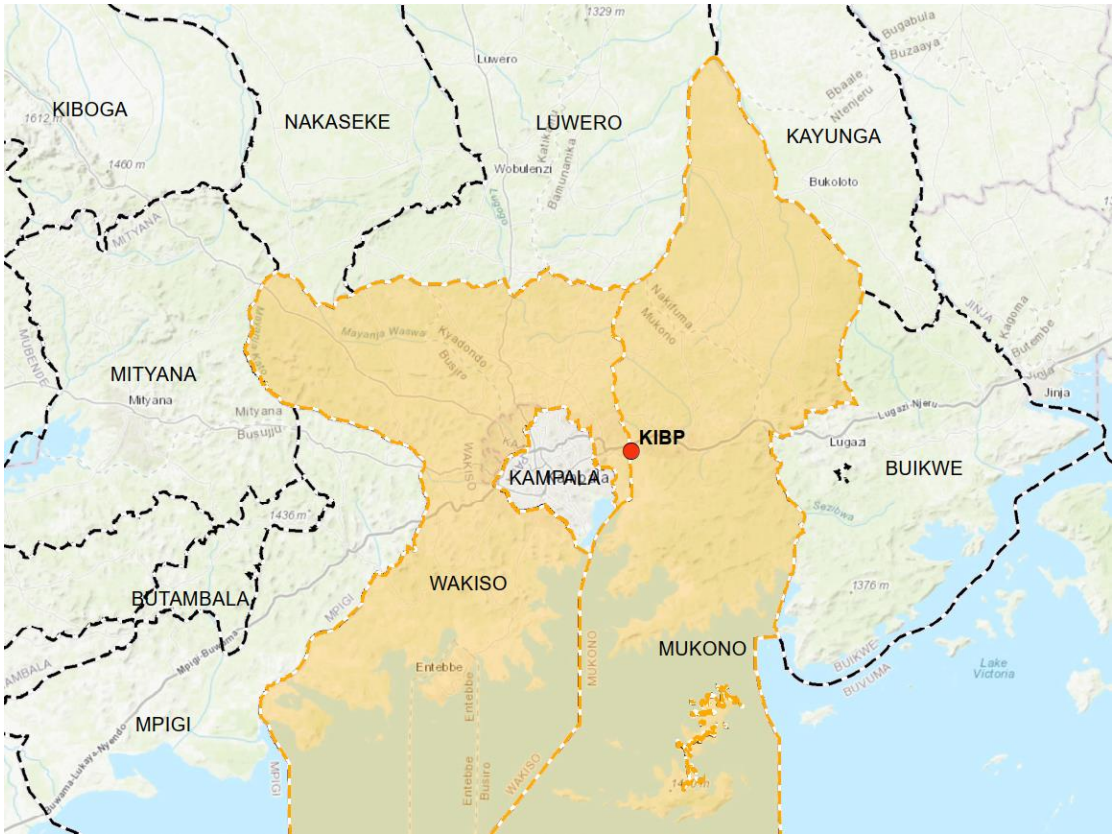
The WAI comprises the two districts, Mukono and Wakiso, in which the Scheme site is situated, as shown in Figure 12.1 below. The districts are located in the nation of Uganda in central Africa. Uganda is a landlocked country that covers an area of 241,000km^2 and borders Kenya, South Sudan, the Democratic Republic of Congo, Tanzania and Rwanda. It is classified as a low-income country.

The LAI encompasses the 12 communities directly adjacent to the Scheme site. This includes owners or users of land parcels immediately adjacent to the site, and village residents and road users located along the site's main transport access routes. The LAI is a generally peri-urban environment, and includes communities centred alongside major thoroughfares and railway tracks. Six of the villages within the LAI are located in the Bweyogerere Division (Wakiso District and six in Goma Division, (Mukono District) as detailed in Table 12.1 below.

Table 12.1: Villages located within the LAI

Wakiso District	Mukono District
Kira Municipality	**Mukono Municipality**
Villages within Bweyogerere Division	**Villages within Goma Division**
Butto	Degeya-Ssenyi
Kireku Main	Kiwanga-Lwanda
Kireku Railway	Koolo-Buwanyi
Hassan Tourabi	Mawotto
Kazinga Main	Nantabulirwa
Namataba	Namilyango-Kisenyi

Figure 12.1: Location of WAI – Wakiso and Mukono Districts and KIBP site

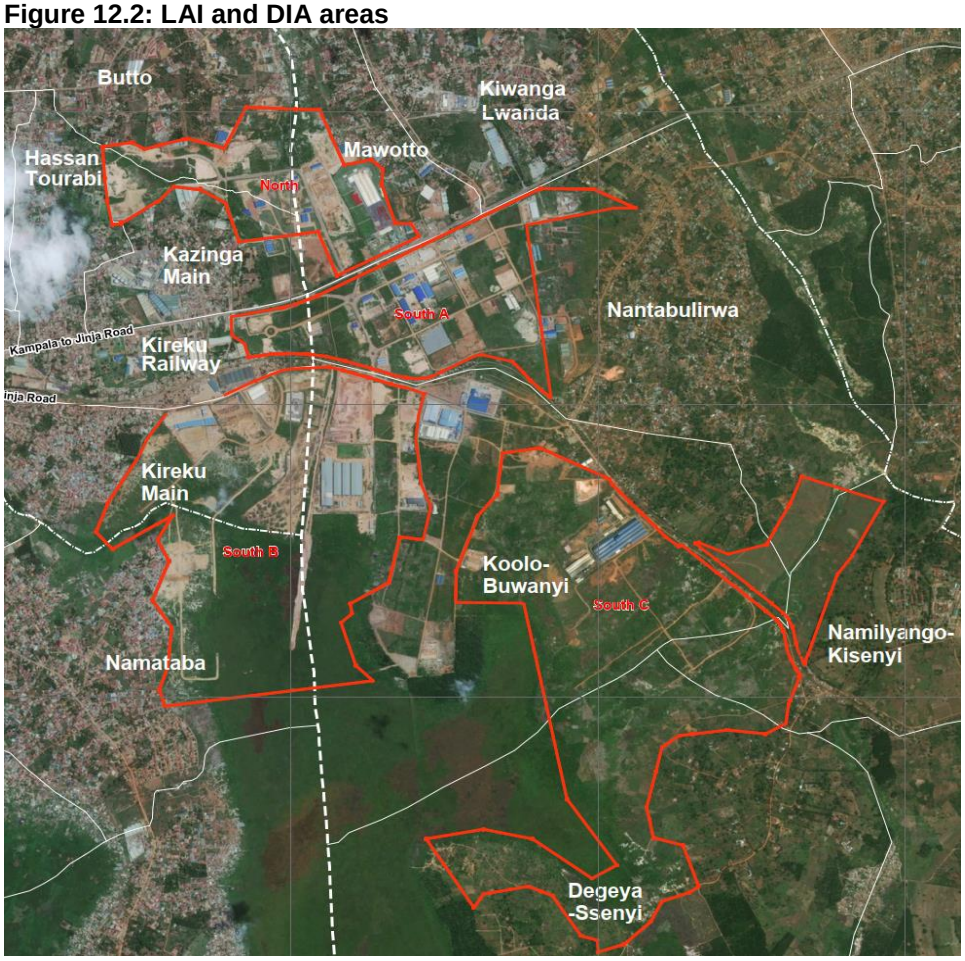


Source: Mott MacDonald, 2019.

The DIA encompasses the immediate KIBP site, and consists of directly impacted social receptors (individuals, households or communities that are impacted by Scheme activities) situated in the site including:

- Land users using the site for livelihoods activities and ecosystem services;
- People accessing the site as an access route to other villages and facilities; and
- Scheme workers and their families, including those working in the currently operating KIBP factories.
  - The LAI and DIA are presented in Figure 12.2 below, with the Scheme site boundaries highlighted in red and the 12 villages comprising the LAI shown.

Figure 12.2: LAI and DIA areas



Source: Mott MacDonald

The Section 12.3 provides baseline data concerning people living and working in the project AoI.

12.2 Methodology

12.2.1 Determining magnitude, sensitivity, and impact significance

Socioeconomic receptors are defined as individuals, households or communities that may be impacted by Scheme activities. The sensitivity of socioeconomic receptors has been determined through consideration of their vulnerability to socioeconomic impacts, as described in the following baseline section. This is measured by their capacity to cope with impacts that affect their access to or control over additional or alternative social resources of a similar nature, ultimately affecting their wellbeing. Sensitive or vulnerable people are generally considered to have less means to absorb adverse changes or shocks than less-sensitive or less-vulnerable receptors. Similarly, they may be less able to maximise and build on beneficial changes to their resource bases.

When considering sensitivity to socioeconomic effects, different resources are relevant to different receptors. For example, a community's vulnerability has been measured in terms of its resilience to loss of community facilities, whereas an individual or household's vulnerability has been considered in relation to their resilience to deprivation and loss of livelihood assets or opportunities (such as jobs, productive land or natural resources). Impacts that increase

impoverishment risks contribute to vulnerability. Impoverishment risks include landlessness, joblessness, homelessness, marginalisation, increased morbidity and mortality, food insecurity, and loss of access to common property resources. Table 12.2 presents the guideline criteria that have been used to categorise sensitivity of receptors.

Table 12.2: Socioeconomic receptor sensitivity criteria

Sensitivity of receptors	Definition
High	An already vulnerable socioeconomic receptor with very little capacity and means to absorb proposed changes or with very little access to alternative similar sites or services.
Medium	An already vulnerable socioeconomic receptor with limited capacity and means to absorb proposed changes or with little access to alternative similar sites or services.
Low	A non-vulnerable socioeconomic receptor with some capacity and means to absorb proposed changes and with some access to alternative similar sites or services.
Negligible	A non- vulnerable socioeconomic receptor with plentiful capacity and means to absorb proposed changes and with good access to alternative similar sites or services.

The magnitude of the socioeconomic impacts has been determined by consideration of the extent to which social receptors gain or lose access to or control over socioeconomic resources, resulting in a beneficial or adverse effect on their individual and collective wellbeing. Wellbeing is considered as the financial, physical and emotional conditions and quality of life of people and communities. Incorporating the criteria described in Section 4.8.1 relating to duration, spatial extent, reversibility and likelihood, Table 12.3 summarises the specific criteria for determining the magnitude of socioeconomic impacts.

Table 12.3: Magnitude criteria

Categorisation	Definition
Major	A highly likely impact that would have implications beyond the Scheme life affecting the wellbeing of many people across a broad cross-section of the population and affecting various elements of the local communities', or workers', resilience.
Moderate	A likely impact that continues over a number of years throughout the Scheme life and affects the wellbeing of specific groups of people and affecting specific elements of the local communities', or workers', resilience.
Minor	A potential impact that occurs periodically or over the short term throughout the life of the Scheme affecting the wellbeing of a small number of people and with little effect on the local communities', or workers', resilience.
Negligible	A potential impact that is very short lived so that the socio-economic baseline remains largely consistent and there is no detectable effect on the wellbeing of people or the local communities', or workers', resilience.

Likely effects are evaluated taking into account the interaction between the magnitude and sensitivity criteria as presented in the effect evaluation matrix in Table 12.4 below.

Table 12.4: Effect evaluation matrix

Sensitivity of Receptor	Magnitude of Impact						
	Adverse			Neutral	Beneficial		
	Major	**Moderate**	**Minor**	**Negligible**	**Minor**	**Moderate**	**Major**
High	Major	Major	Moderate	Negligible	Moderate	Major	Major
Medium	Major	Moderate	Minor	Negligible	Minor	Moderate	Major
Low	Moderate	Minor	Negligible	Negligible	Negligible	Minor	Moderate
Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

Effects that have been evaluated as being 'Moderate' or 'Major' are significant effects. Consequently, impacts that are 'Minor' or 'Negligible' are not significant.

12.2.2 Socioeconomic survey methodology

As part of the livelihood restoration planning, socioeconomic, census and asset surveys were conducted from April to May 2019 for a partial sample of individuals that were identified to be undertaking informal livelihood activities within the site. These households reside in the villages of Butto, Hassan Tourabi, Kazinga Main, Kireku Railway, Namataba, Koolo-Buwanyi, Degeya-Ssenyi, Namilyango-Kisenyi and Mawotto.

In total, 131 affected households were included in the surveys. As the Scheme design has not been finalised, a 100% sample survey was not undertaken as part of the scope of the current ESIA package. While a 100% sample census will need to be undertaken as part of an updated, implementation-ready LRP once Scheme design freeze is reached, the existing partial sample is considered a sufficient sample size for us to assess the general significance of displacement effects in this ESIA.

12.2.3 Limitations and Assumptions

There is lack of secondary baseline information in the form of official government census data available at the village level, such as ethnicity-disaggregated data for social indicators, as well as comprehensive comparable data across the national, district and division levels for several indicators related to poverty and wellbeing. Much of the baseline data presented for the LAI is information obtained from consultation with village authorities and affected peoples, personal observations of the ESIA consultants, and the results of socioeconomic surveys completed with a sample of households affected by economic displacement (see LRP in Volume IV). National, district or division level data has been used as a proxy for the LAI, where deemed appropriate.

The assessment of impacts is based on the site boundaries as established in current designs. Should the final iteration lead to any change in the boundaries, this may lead to increased or decreased land take and require updates to the anticipated displacement impacts.

12.3 Baseline

This section presents a summary of the baseline socioeconomic characterisation for the Scheme. This will enable a comparison of the current situation with changes anticipated as a result of the Scheme.

12.3.1 Governance

Each village is represented by a local council (LC1), the lowest political administrative unit in Uganda. Local councils generally consist of a chairperson and nine members that are democratically elected by the village members and include representatives of youths and women. Urban and rural areas in Uganda have slightly different governance structures. In the LAI, considered urban, there are several administrative levels above the villages including the division, municipality and district. The KIBP site is situated within the Bweyogerere Division (Kira Municipality, Wakiso District) and Goma Division (Mukono Municipality, Mukono District).

12.3.2 Demographics

The Scheme site (DIA) is a former Central Forest Reserve and is not inhabited. The surrounding LAI is a peri-urban area that is primarily densely populated with low-income housing. The Wakiso District on the western side of the WAI is more urbanised than the Mukono District in the east,[23] with nearly two thirds of the land being classified as urban, compared to just over a

[23] https://www.ubos.org/onlinefiles/uploads/ubos/census_2014_regional_reports/Census_2014_Report_Central_Region.pdf

quarter for Mukono. The demography of the applicable Districts and Divisions are shown in Table 12.5 with individual and household (HH) statistics.

Table 12.5: Demographic indicators in the WAI

Area	Total population	Male	Female	M:F ratio	Total HH	% of HH headed by women
Mukono District	596,804	289,757	307,047	94	144,160	29.7
Goma Division	93,039	43,495	49,544	88	21,442	26.4
Wakiso District	1,997,418	949,035	1,048,383	93	501,463	26.2
Bweyogerere Division	106,842	50,216	56,626	89	27,365	23.6

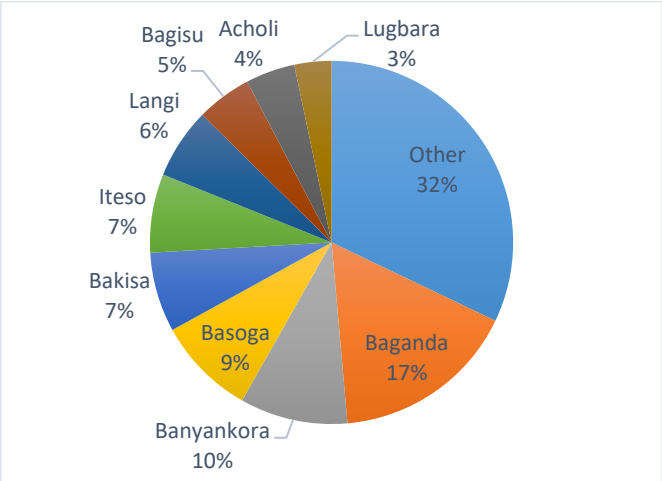
Source: Mukono and Wakiso District government websites

Namataba village has the largest population of approximately[24] 20,000 people followed by Nantabulirwa with 17,000, while the other villages have a population each ranging between 800 to 2,000 people. Hence, the total population living within the LAI is between 50,000 to 68,000 people.

12.3.3 Ethnicity, Language and Religion

Uganda has a diverse range of ethnic groups as shown in Figure 12.3 The LAI villages comprise mixed ethnic backgrounds, with Baganda being the biggest group represented, and others including Lugbara, Japadhola, Bagisu, Iteso and Basoga. The vast majority of residents speak Luganda, the Baganda language and the most widely-spoken language in the country.

Figure 12.3: Ethnic groups of Uganda



Source: Uganda 2014 National Census

[24] Within the LAI there exists a wide range of population statistics and an absence of official census statistics at the village level, therefore anecdotal village-specific information was obtained from the LOCAL COUNCIL committee leaders.

The Ugandan Constitution recognises all 65 tribes who were in existence at the end of colonisation as being indigenous communities.[25] 17 groups are considered to be small ethnic groups with fewer than 25,000 people[26]. There also exist other groups that have not been included in the national census or Constitution but self-identify as minority groups or have been listed as such by researchers.[27] In Uganda, small minority groups experience unequal access to resources, frequently live in remote geographical locations, in small communities, are poorer than the average population, have limited political representation and lack access to basic social services.[28] Among the groups considered to be small minority groups by Minority Rights International[29],the Lugbara people are present in the Kireku Railway village in the LAI. Uganda's small ethnic groups that face marginalisation tend to live in remote locations rather than peri-urban areas, and the Lugbara households do not face particular challenges as a direct result of their ethnicity.[30] The Batwa, an endangered indigenous group found in southwestern Uganda, are not present in the LAI.

Christianity is the main religion of Uganda and approximately 80% of people in the WAI identify themselves as Christian, 20% as Muslim and 1% belong to another or no religion. Within the LAI villages, a smaller proportion ranging from 1% to 10% of the population are Muslims. While Uganda's constitution allows freedom of religion, Muslim Ugandans have reported experiencing discrimination in political and social spheres.[31] Such issues were not noted by village leaders and community members consulted in the LAI.

There are no specific groups within the Scheme AoI considered to be marginalised or vulnerable as a result of their ethnicity or religion, or that are considered to meet the IFC criteria to be classified as indigenous peoples.

12.3.4 Economy, Employment and Livelihoods

Agriculture is currently the main economic activity in the WAI, and 65% of households in Mukono District and 69% in Wakiso District depending on subsistence farming as the main source of livelihood. Commercial cash crops include vanilla, coffee, mangos and cotton. Crops grown for subsistence include bananas, cassava, maize, beans, potatoes and yams. Among households headed by subsistence farmers, the percentage living in poverty increased from 20% in 2012/13 to 38% in 2016/17, due to recent severe droughts which affected most parts of the country. This shows the high vulnerability of households reliant on subsistence agriculture to climatic conditions.

Nearly 70% of people aged 16 to 64 years in Mukono District and 74% in Wakiso District are working, undertaking a range of productive activities including subsistence agriculture. Much of the older population (defined in Uganda as those aged 60 and above) is still economically-active, with two thirds and half of them still working in the Mukono and Wakiso Districts, respectively. This is likely due to the lack of social security and need to support younger generations with no parents.[32] There are more young people (identified as 18 to 30 year olds)

[25] https://www.fhri.or.ug/index.php/pages/whats-new/item/212-recognize-and-protect-the-rights-of-indigenous-minority-groups-in-uganda

[26] These include Aliba, Banyabindi, Bahehe, Banyabutumbi, Basongora, Batwa, Gimara, Ik, Lendu, Mening, Mvuba, Ngikutio, Nyangia, Reli, Shana, Tepeth and the Venoma. They collectively represent about 1% of the national population or more than 200,000 people

[27] Including the Benet, Barundi, Bayaga, Bagangaizi, Meru, Basese, Mwanngwar, Bakingwe and Banyanyanja

[28] https://www.monitor.co.ug/Magazines/PeoplePower/Minority-ethnic-groups-battle-to-preserve-their-heritage/689844-3203168-si57p5/index.html

[29] in the north – Alur, Ik (Teuso), Kakwa, Karamojong cluster, Lugbara, Luluba, Ma'di, Nubian; in the east – Bagungu, Bakenyi, Bavuma, Ik (Teuso), Soo; and in the west – Abayanda (Batwa), Ba'amba, Bakonzo. https://lib.ohchr.org/HRBodies/UPR/Documents/session12/UG/JS6-JointSubmission6-eng.pdf

[30] Based on discussions with LOCAL COUNCIL members and community members of Chireku Railway village

[31] https://minorityrights.org/wp-content/uploads/old-site-downloads/download-143-Uganda-The-Marginalization-of-Minorities.pdf

[32] https://www.un.org/en/development/desa/population/events/pdf/other/15/Session3/Uganda%20presentation_EAjiambo.pdf

who are not working or in school in the Mukono District (15%) and the Wakiso District (13%) than the national average of 9%, reflecting the fewer economic or educational opportunities available in the WAI.

Within the WAI, governmental authorities at various levels consulted throughout the ESIA process have received claims of poor labour and OHS practices in the factories currently operating in the KIBP, from their constituents. Uganda is signatory to several International Labour Organisation's labour conventions and there are national provisions for protection of workers' labour rights, health and safety. However, these protections are poorly enforced.

A Uganda Human Rights Commission study found that some of the labour rights most commonly violated in the country include the right to equal pay for equal work done, clarity around remuneration amounts and payment schedules, personal protective equipment (PPE), provision of contracts of employment, rest breaks, and the right to freedom of association.[33]

Workers' awareness of their rights to a safe and healthy working environment is poor, and workers are often exposed to faulty plants and equipment and dangerous civil works leading to injury and death.[34] One 2014 study found injury rates of 3,797 and fatality rates of 84 per 100,000 workers respectively at construction sites in Kampala[35] – significantly higher rates compared to an average of 1,642 injuries and 2.38 fatalities per 100,000 in the EU-28 countries in 2015[36].

Although child labour exists in Uganda, 95% of working children are engaged in family agricultural work, and no significant concerns within the construction sector have been identified.[37] A minority of working children (fewer than 5%) are based in the service and industrial sectors, such as quarrying stone, manufacturing, domestic work and retail. 10% of the children are self-employed and 2% working for a wage.[38] Child labour is not considered a significant risk in relation to the KIBP.

Within the LAI, households typically engage in multiple income generating activities in addition to subsistence agriculture including petty trading, brick making, cattle grazing, sand mining, small-scale agriculture, crafts, 'boda boda' (motorcycle taxi) driving, mechanics and factory work. Some households practice animal husbandry including cattle, pigs and poultry rearing. Typically, households own between one to ten cattle and/or goats.

Livelihood activities being undertaken in the DAI (within site perimeters) include:

- **Factories currently operational in the KIBP**: There are currently 21 operational plants. Workers employed at the KIBP factories are mainly based in the LAI villages. Kireku Railway village particularly has a high number of residents who migrated to the area in recent years to work in the KIBP, likely due to its good transport links.
- **Small-scale agriculture**: Following the UIA acquisition of the land, the UIA gave informal permission to local villagers to grow crops such as sweet potatoes, cassava and maize on the former forest reserve land in recognition of the shortage of alternative private land for cultivation[39]

[33] http://uhrc.ug/system/files_force/ulrc_resources/WORKERS%20RIGHTS.pdf

[34] http://www.oag.go.ug/wp-content/uploads/2017/04/Enforcement-of-Occupational-Safety-Health-OSH-at-workplaces-by-DOSH.pdf

[35] https://www.sciencedirect.com/science/article/pii/S0925753513002920

[36] https://ec.europa.eu/eurostat/statistics-explained/index.php/Accidents_at_work_statistics

[37] https://www.refworld.org/pdfid/5bd05afa16.pdf

[38] http://documents.worldbank.org/curated/en/103571468194955640/pdf/103603-WP-v1-PUBLIC-REVISED-add-series-SEE-Uganda-Excecutive-summary-child-labor-youth-emp20141016-155128.pdf

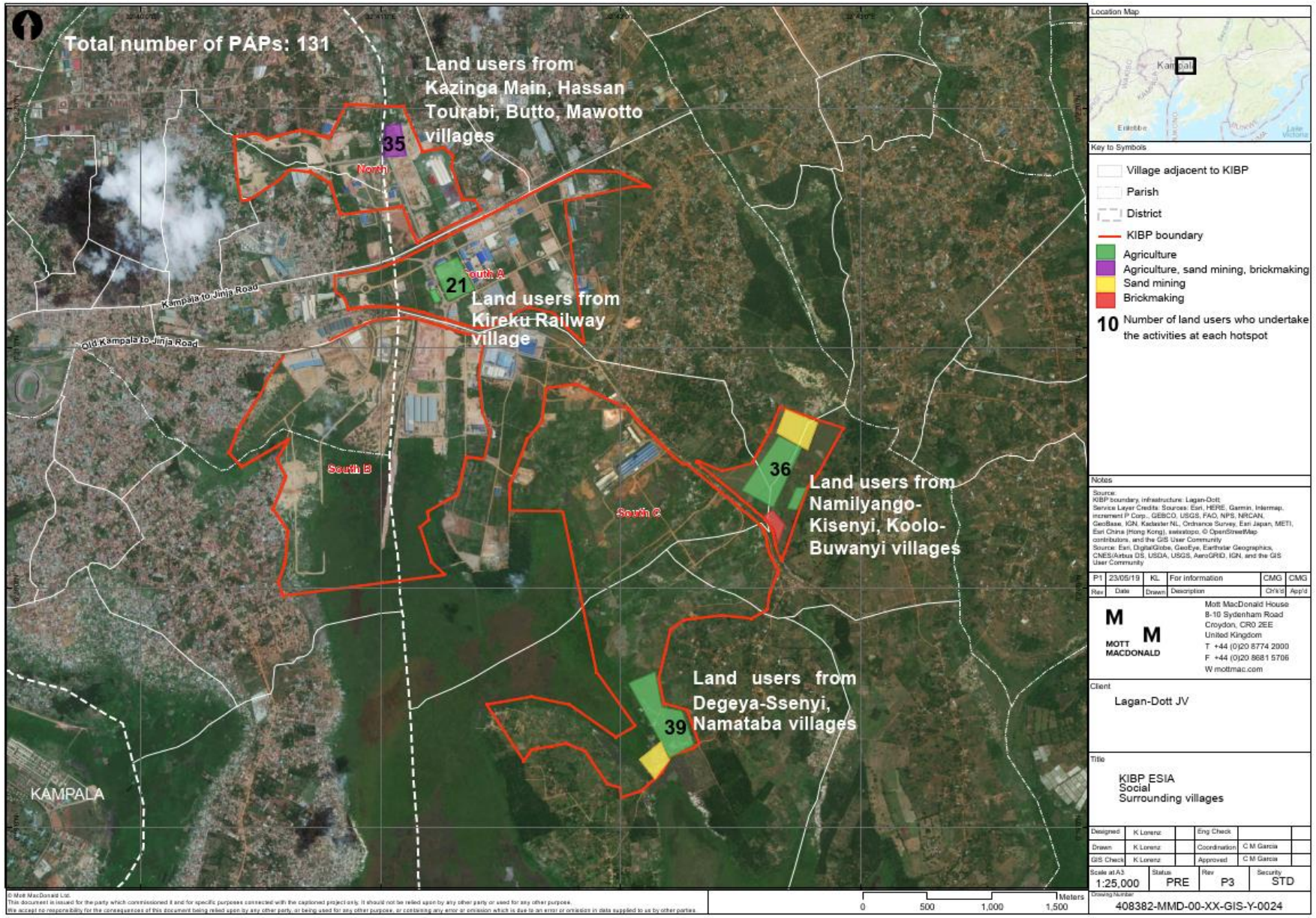
[39] According to local councils and community members consulted

- **Sand mining and brickmaking:** Brick and sand construction materials are extracted from the KIBP site at several hotspots by LAI villagers (further described in section 12.3.5)
- **Cattle grazing:** The local villagers bring their cattle to the site to graze every day and all year round. They use vacant land all over the site. The villagers of Namilyango and Namataba also take grass from various locations in the KIBP site to bring back to their own land and cattle.

The agricultural, sand mining and brickmaking activities taking place on the KIBP site are shown in Figure 12.4 below. At least 131 individuals residing in the LAI villages have been identified as undertaking at least one of these three livelihood activities. Among those surveyed,[40] they rely on these activities as their main and often only source of income and have low income levels, with 30 individuals (23%) earning less than US$57 per month, which is considered below the international poverty line of US$1.90 per day. The land users have been undertaking the on-site livelihood activities as their main source of income for three to ten years. They engage in these activities but do not have formal land ownership or usage rights. Without viable employment opportunities, or alternative officially registered land parcels available, they are dependent on these activities and access to the site for their livelihoods.

[40] A census survey was undertaken with a partial sample of the affected land users based on current Scheme designs. Thus this is not a 100% sample

Figure 12.4: Location of Affected Livelihood Activities on KIBP Site



Source: Mott MacDonald

12.3.5 Natural Resource Use for Livelihoods

In recent decades, demand for sand and brick building materials in and around Kampala has continued to grow due to the increasing population and corresponding demand for residential facilities, and commercial interests in the growing construction industry. KIBP has been a key source of informal extraction of these materials, due to its proximity to Kampala and ostensibly low security oversight and access restriction.

LAI villagers have been extracting sand and clay from the Scheme site for local use and sale for several years, following degazetting of the site in 1996. This is an illegal activity[41] and several people have previously been arrested and fined for these activities and trespassing.[42]

The main natural resources within the DAI that constitute ecosystem services supporting LAI residents include sand, clay,[43] water and scattered clusters of trees, shrubs and isolated bushes. Wood collection is rare as most of the tree coverage has been removed to make way for Scheme works. Brickmaking using clay from the Scheme site is another income-generating activity and the KIBP security personnel have attempted to shut down these operations however they persist across the site. There are three hotspots where sand mining and brickmaking activities are being conducted by multiple individuals (detailed in Section 12.4.2.1).

Grassland is used for grazing across all four sectors of the KIBP site. There are five spring wells located in the DAI that are used by several LAI villages for drinking and household purposes including laundry, washing, and cooking as shown in Figure 12.5 and Figure 12.6 below. While some villages have access to alternative sources of water such as connections to the national water service via the National Water and Sewerage Corporation or other spring boreholes, other villages are dependent on the spring wells within the KIBP site as their sole source of water, as described in section 12.4.2.2.

Figure 12.5: Spring well in KIBP site used by Kazinga Main village

Source: Mott MacDonald

Figure 12.6: Cattle grazing in KIBP site

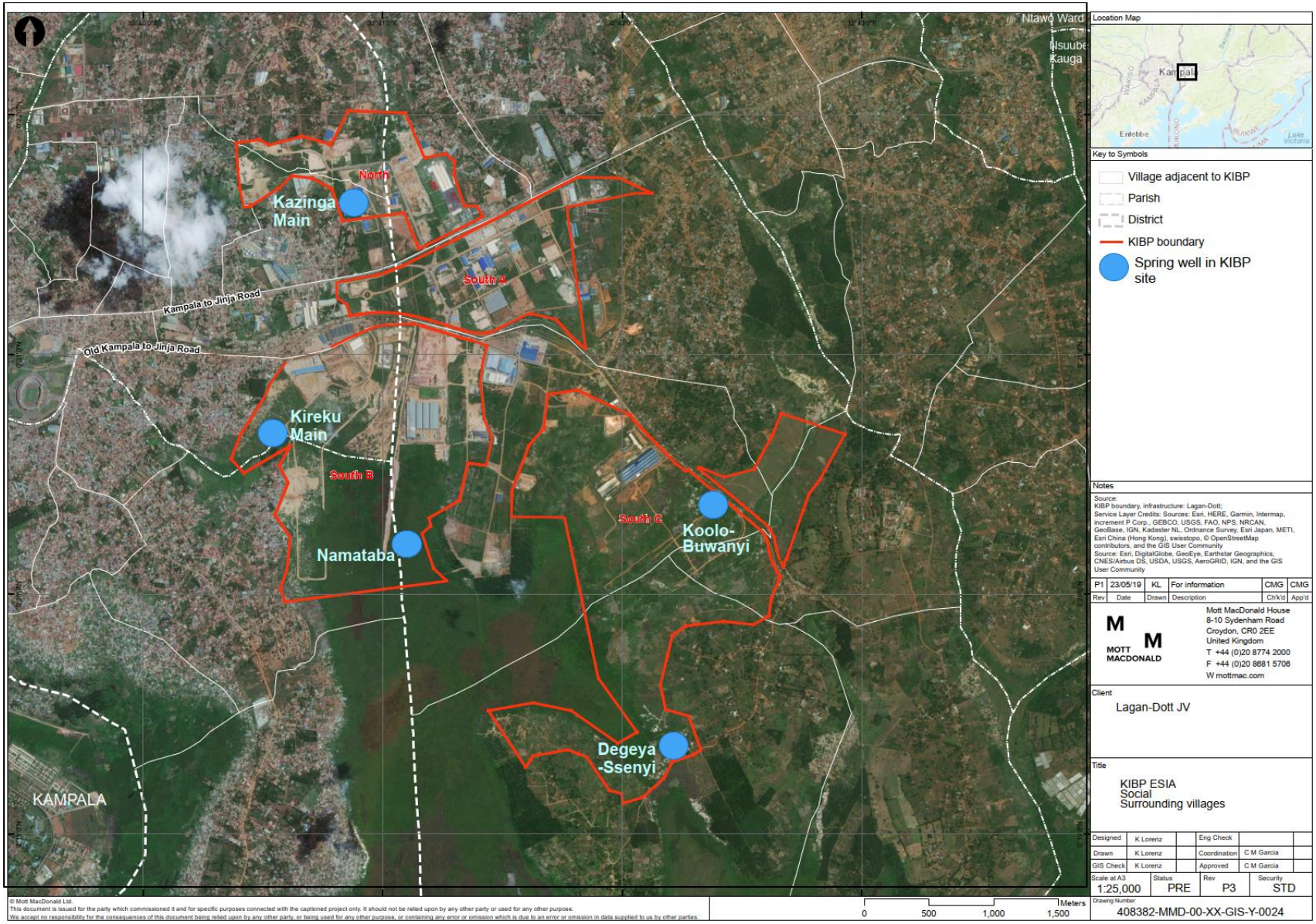
Source: Mott MacDonald

[41] The open sand pits can cause flooding, and create breeding grounds for mosquitoes and habitats for inversive aquatic plants. http://dispatch.ug/2018/10/23/uganda-criminalizes-sand-mining-lakes-river-banks/; https://allafrica.com/stories/201902060177.html

[42] There are additional allegations of corruption related to sand mining activities, including the extortion of sand miners by governmental officials to not report them to the police https://mulengeranews.com/top-finance-ministry-official-fired-for-stealing-govt-sand/

[43] Murram, a form of laterite (clayey material) often used for road surfaces in Africa

Figure 12.7: Location of spring wells in the KIBP site



Source: Mott MacDonald

These natural resources in the DAI are considered to be provisioning ecosystem services[44] because they provide raw materials directly used for livelihood and household subsistence purposes.

12.3.6 Land Tenure

There are four types of land tenure systems in Uganda for both residential and agricultural land, as shown in Table 12.6 below. 75% of the land is regulated by customary tenure systems.[45] Only 15-20% of the land is formally registered.[46] Common law also recognises "Licensees" or "Sharecroppers", who are granted authority to use land for agricultural production traditionally for annual crops. Licensees have no legal security of tenure or any property right in the land and their tenure is purely contractual.

Table 12.6: Land tenure regimes in Uganda

Type	Description
Customary	• Not governed by written law; customary occupants occupy former public land by virtue of their customary rights and land is owned in perpetuity • Communal landholding is also recognised under customary tenure
Freehold	• Land such as freehold tenures held by religious bodies • Land is held in perpetuity or a fixed term and enables the holder to exercise full powers of ownership
Leasehold	• Grants the lessee exclusive usage and possession of the land for a specified period of time usually in return for a rent • The tenant has security of tenure
Mailo	• Mailo (traditional) land belongs to the Kabaka (traditional king) of Buganda or other landlords. Ownership of land is separate from ownership of developments on land made by occupant • Land is held in perpetuity and enables the holder to exercise full powers of ownership[47]

Source: Arua Water Supply and Sanitation Project, Resettlement Action Plan, 2013

The main land tenure system in the LAI is the Mailo land system. Other present systems include leasehold, customary tenure as well as informal "squatting".[48] Those using land in an informal manner are susceptible to lack of secure tenure as they have no customary, usage or ownership rights to the land. While precise statistics at the village level are not available, all 12 LAI villages have residents who are informally residing on land plots.

12.3.7 Security and Public Safety

The two districts on the WAI experience a range of crimes including robberies, thefts and assaults which is typical of densely populated, urban and impoverished areas such as these. In 2017 for instance, both districts were in the top twelve out of Uganda's 80 districts for incidents of aggravated motor vehicle robbery and theft of motorcycles. [49]

Within the DIA, there are currently three police posts with a vehicle and two motorcycles.[50] Security in the DIA has been identified as an ongoing issue by community members and division and village governmental authorities due to poor lighting, poor traffic oversight and lack of comprehensive security management systems across the site and its various businesses. Incidents of armed robbery of workers, including by site security offers and fellow workers, have been reported to the police.[51] Robberies tend to occur near the end of each month when the

[44] As per World Resources Institute's ecosystem services guidance: "weaving Ecosystem Services into Impact Assessment", 2013

[45] http://www.fao.org/gender-landrights-database/country-profiles/countries-list/land-tenure-and-related-institutions/prevailing-systems-of-land-tenure/en/?country_iso3=UGA

[46] https://www.land-links.org/country-profile/uganda/

[47] Subject to the rights of those persons occupying the land at the time of the creation of the mailo title and their successors

[48] For instance, the majority of the residents in Nantabulirwa Village are squatting on Mailo land

[49] https://www.upf.go.ug/wp-content/uploads/2018/07/ANNUAL-CRIME-REPORT-2017.pdf

[50] https://ugandaradionetwork.net/story/insider-job-crime-major-challenge-at-namanve-park-police

[51] https://ugandaradionetwork.net/story/insider-job-crime-major-challenge-at-namanve-park-police

factory workers are paid their salaries in cash and are more vulnerable to theft. The site is unsafe particularly at night-time for pedestrians who use it as an access route to other villages.

Road traffic accidents present a serious risk to road users; Uganda loses 10 people per day in road traffic crashes on average, the highest level in East Africa, with pedestrians representing 40% of the fatalities.[52] Various factors contribute to the high mortality rates including a lack of robust safety laws, unregulated public transport systems and poor-quality vehicles and road conditions. Figure 12.8 shows some of the traffic in Kireku Main village that is located along the Kampala-Jinja Road, a key access road for the KIBP. Such dirt roads become more dangerous for both pedestrians and motorists following rain, as the muddy surface increases the risk of falls, accidents and congestion.

Figure 12.8: Kireku Main Village, located along Kampala-Jinja Road

Source: Mott MacDonald

Several access roads are dispersed throughout the KIBP Scheme site as shown in Figure 12.9 and Figure 12.10. These are frequented by pedestrians using it as a pathway to reach other village areas in the Wakiso and Mukono Districts.

Figure 12.9: Pedestrian route in KIBP site

Source: Mott MacDonald

Figure 12.10: Pedestrian route in KIBP site

Source: Mott MacDonald

[52] www.unece.org/fileadmin/DAM/road_Safety/Documents/RSPR_Uganda_February_2018/Uganda_Road_Safety_Performance_Review_Report_web_version.pdf

12.3.8 Health

A range of health services are available in both Districts (see Table 12.7), however only 20% of Goma Division residents and 12% in Bweyogerere Division are located within 5km a public health facility. Of the 12 LAI villages, three do not have their own health centres and use facilities in neighbouring villages. The population in the LAI lacks easy access to health facilities, given the high cost of private medical care and limited range of affordable public health facilities near the villages. Municipal and village authorities have claimed that the in-migration of existing KIBP factory workers has already placed a strain on their public health facilities in addition to causing higher rent prices.

Table 12.7: District health services

Type of health facility	No. of facilities in Mukono District	No. of facilities in Wakiso District
Hospital	1 (NGO-run)	2 (1 government and 1 private)
Public health centre	3	17
Private/NGO health centre	15	15
Dispensaries	21	39
Private/NGO clinics	83	58

Source: Uganda 2014 Population & Housing Census

Uganda as a whole demonstrates poor health outcomes due to factors including lack of trained medical staff and equipment, poor and erratic drug distribution and low public expenditures on health. Human Immunodeficiency Viruses (HIV) prevalence is higher in urban areas of Uganda than rural counterparts (7.1% vs. 5.5% respectively).[53]

Uganda's maternal mortality rate at 343 deaths per 100,000 live births is significantly higher than the global average of 216.[54] Similarly, the national life expectancy for both men and women is lower than the global average: 62.2 for men and 64.2 for women,[55] compared to 70.1 for men and 74.5 for women globally.[56] Uganda also has the highest incidence rate of malaria in the world, with 478 people out of 1,000 being affected per year.[57] Out of pocket payments for health services is 37% which is above the WHO's recommended maximum of 20% for catastrophic expenditure.[58] This reflects that households are highly vulnerable to unaffordable health care and medication costs.

12.3.9 Education

Uganda offers universal free education in the public, government-run primary and secondary schools. Multiple stakeholders have indicated that demand for free education far outstrips the availability of places at these schools however.

[53] https://www.unaids.org/sites/default/files/country/documents/UGA_2018_countryreport.pdf

[54] https://data.unicef.org/wp-content/uploads/country_profiles/Uganda/country%20profile_UGA.pdf

[55] National Census 2014

[56] https://data.worldbank.org/indicator/SP.DYN.LE00.FE.IN

[57] http://www.newvision.co.ug/new_vision/news/1423973/malaria-leading-cause-death-uganda

[58] https://apps.who.int/iris/bitstream/handle/10665/136975/ccsbrief_uga_en.pdf;jsessionid=62B1CAD6664677A31DB2252DB577DF0F?sequence=1

Both Districts in the WAI provide a range of educational facilities from primary to post graduate.

Table 12.8: District educational institutions[59]

Type of institution	Mukono	Wakiso
Primary	634	570
Secondary	90	140
Tertiary	2	1

Source: AWE 2013, Wakiso District Government 2015

At the village level, the number of primary schools range from two to eleven per village, with most being private institutions that charge fees. A total of 33 secondary schools are present, with most villages having four or fewer institutions each. No vocational or tertiary institutions are located in the LAI.

Table 12.9 presents a summary of educational attendance and literacy rates for the two districts. Although primary school attendance rates are comparable to the national levels, secondary school attendance rates are significantly lower than the national average of 80.6%.[60]

Table 12.9: District educational attendance, education and illiteracy levels

Indicator	Mukono District			Wakiso District		
	Total	Male	Female	**Total**	Male	Female
% of 6-12 year olds attending primary school	**86**	85	86	**85**	84	86
% of 13-18 year olds attending secondary school	**44**	41	46	**49**	50	48
People aged 18 years and above who are illiterate	**18**	15	20	**10**	8	11

Source: Uganda Bureau of Statistics, 2014, published April 2017

Local government authorities report that many residents are semi-literate and only a few can speak English as a second language. Many households do not send their children to school due to the cost of private schools and lack of spaces at public schools.

12.3.10 Water, Sanitation and Waste

Mukono and Wakiso Districts are connected to the National Water and Sewerage Corporation water supply network. However, nearly 20% of households in the Goma division do not have access to safe water, compared to 24% at the District level (National Population and Housing Census, 2017). In comparison, in Bweyogerere division only 7% of households lack access to safe water compared to 18% at the District level (National Population and Housing Census, 2016), indicating that Goma households are more vulnerable to lack of access to safe water. Most households in the LAI have pit latrines housed in small informal structures. Very few households in Goma and Bweyogerere Divisions do not have toilet facilities (0.3% and 1% respectively).

There are no formal waste disposal services available to the LAI communities because the area is not covered by the Kampala City Council (KCC) waste disposal system. Household solid waste materials are disposed of either in gardens, or in the surrounding bush. Small scale burning of household solid waste is common. The Scheme site is often used as a dumping ground for solid waste. Lack of adequate, comprehensive waste disposal systems in Uganda has been noted as a public health hazard, particularly in urban areas where residents consume more disposable waste than their rural counterparts.[61] This increases the vulnerability of the locally affected people.

[59] Tertiary institutions include Uganda Christian University and Lugazi University (Mukono District), Nkumba University (Wakiso District)

[60] Uganda National Household Survey 2016/17 and National Population and Housing Census, 2014

[61] https://washmatters.wateraid.org/publications/solid-waste-management-study-in-kawempe-uganda-2011

12.3.11 Gender Relations

Women and female-headed households in Uganda have more limited access to resources and opportunities compared to their male counterparts. They have more limited access to productive resources including land and credit, limited involvement in decision making, bear disproportionate burden of caregiving, and experience higher incidence of poverty and food insecurity. Women also face more vulnerability to HIV/AIDS; 8.8% of women live with HIV compared to 4.3% of men. HIV prevalence among sex workers is even higher at 37% as of 2015.[62]

Gender-based violence is widespread and perpetuated by cultural norms. One 2015 study found that 58% of women and 44% of men believe that it is justified for a man to beat his wife and identified Uganda as one of the most dangerous places in the world for women.[63] In 2011, 65% of women reported having suffered domestic violence, while 22% had experienced sexual violence at least once since the age of 15. Wakiso and Mukono alongside Kampala were found to be the districts in Uganda with the highest number of domestic violence cases reported from 2010 to 2016.[64] Sex workers are particularly vulnerable to physical violence in addition to extortion, arrests and robberies.[65]

12.3.12 Summary of the Most Vulnerable People

In the Scheme WAI, vulnerable people who by virtue of gender, ethnicity, age, physical or mental disability, economic disadvantage, or social status, may be more adversely affected by socioeconomic shocks include:

13. Households living below international poverty line of US$1.90 per day. The proportion of people living in poverty in Uganda has been reported as being on decline from 34% in 1999/2000 to 27% in 2016/2017.[66] This statistic however does not reflect increasing inequality within and across the country.[67]
14. Households headed by women who suffer from lower household incomes and fewer economic and other opportunities as a result of gender relations in Uganda
15. Households headed by elderly (aged 60 and above)
16. Disabled or seriously sick people, particularly people living with HIV/AIDS and other chronic illnesses

These categories are discussed further in the below paragraphs.

Many LAI households earn less than US$57 per month, which is considered below the international poverty line of US$1.90 per day.[68] This appears to be generally comparable to the national poverty headcount of 27%.[69]

At the national and district levels, approximately 30% of the households are headed by women.[70] In several LAI villages, deaths of spouses from HIV and high rates of divorce linked to men's high unemployment rates lead to the presence of women-headed households throughout

[62] https://www.avert.org/professionals/hiv-around-world/sub-saharan-africa/uganda

[63] http://noneinthree.hud.ac.uk/wp-content/uploads/2018/06/Uganda-policy-briefing-Apr18.pdf

[64] https://mobile.monitor.co.ug/News/Crime-against-women--children-on-rise---report/2466686-3833756-format-xhtml-139r0cuz/index.html

[65] https://hrapf.org/images/researchpapers/161228legalregulationofsexworkersinugandastudy_updated-1.pdf

[66] https://www.ubos.org/onlinefiles/uploads/ubos/pdf%20documents/UNHS_VI_2017_Version_I_%2027th_September_2017.pdf

[67] http://siteresources.worldbank.org/INTUGANDA/Resources/uganda-poverty-and-inequality-trends-full-policy-note.pdf.

[68] Purchasing Power Parity (PPP) per capita per day. The national poverty line ranges from US$0.88 to US$1.04 2005 PPP per capita depending on the region. However given that the national poverty line has not been updated since 1993, the World Bank considers this to be a poor indicator of current poverty rates. Thus the international poverty line is applied for this Scheme. http://pubdocs.worldbank.org/en/381951474255092375/pdf/Uganda-Poverty-Assessment-Report-2016.pdf

[69] The percentage of individuals estimated to be living in households with real private consumption per adult equivalent below the poverty line for their region (divided into rural and urban). Source: Uganda National Household Survey 2016/17

[70] Wakiso and Mukono District Census, 2014

the villages. Being widowed has been shown to result in significant adverse socio-economic impacts for households in Uganda, including reduction in land cultivation area by up to 26% for small-scale farmers.[71]

85% of the active older persons in Uganda (defined as those aged 60 and above) are engaged in crop farming with no social security. Their economic situation is often worsened by the burden of looking after orphans and other vulnerable children left behind by the HIV/AIDS pandemic, with 10% of all households headed by the elderly (compared to 7% and 13% for the two districts, respectively). Only 7% of older persons have access to pension, of which 60% are males. [72]

As in many developing countries, disabled Ugandans face extreme conditions of poverty and have limited opportunities for accessing adequate education, health, housing and employment opportunities. The two divisions comprising the LAI have lower disability rates at 6.6% and 5.6% respectively compared to the national average of 12.5%, as well as lower rates of orphaned children.[73]

Within the LAI, local council members of all 12 villages indicate that they have vulnerable households who meet the above criteria, although precise figures are not available. Overall, the two districts and respective divisions comprising the LAI are considered to have comparable rates of poverty and elderly - and women-headed households, and slightly lower rates of disability.

The impact assessment and mitigation makes particular consideration of these vulnerable groups. Specific mitigation is proposed to protect them from significant adverse impacts, as well as benefit sharing measures so that the Scheme is used as a development opportunity for them. They have also been identified and targeted through specific consultation measures, as discussed in Section 17.

12.4 Assessment of Effects

12.4.1 Introduction

This section describes the impacts which the infrastructure works for the KIBP are expected to have on the existing conditions in the Scheme area. It then sets out mitigation measures to reduce the impacts before summarising any residual impact which will remain flowing mitigation. The assessment is based on the baseline data detailed in Section 12.3. The following subsections will detail the impacts and effects identified, and mitigation measures identified to address them.

12.4.2 Construction Impacts

12.4.2.1 Economic Displacement and Livelihood Impacts

The need to restrict public access to the Scheme site construction works will result in economic displacement impacts, defined as loss of assets or access to assets that leads to loss of income sources or other means of livelihood. Physical displacement, defined as relocation or loss of shelter, is not going to occur. At least 131 individuals identified through the socioeconomic survey (described in Section 12.2.2) and profiled in the baseline chapter (Section 12.3.4) will experience economic displacement impacts as they will no longer be able to undertake livelihood activities in the DAI.

[71] www.fao.org/gender-landrights-database/country-profiles/countries-list/land-tenure-and-related-institutions/other-factors-influencing-gender-differentiated-land-rights/en/?country_iso3=UGA

[72] https://www.un.org/en/development/desa/population/events/pdf/other/15/Session3/Uganda%20presentation_EAjiambo.pdf

[73] Central Region Census, 2014, Uganda National Household Survey and National Population and Housing Census, 2014

This is as a result of the fencing and security perimeter that will be established around the site boundaries, restricting public access, and the conversion of the land being used for informal livelihoods into industrial usage.

There are three categories of informal livelihood activities being undertaken on site that will be displaced (locations within the KIBP site presented in Figure 12.4):

- Agriculture: small-scale cultivation of perennial and seasonal crops including cassava, maize, sweet potatoes, sugarcane, yam, bananas and rice;
- Sand mining: extraction of sand from sand pits; and
- Brickmaking: moulding and construction of mud bricks from clay.

Table 12.10: Summary of economic displacement impact

Category	Number of PAPs	Comments
Crop loss	84	24 undertake commercial agricultural activities, 19 in subsistence and 32 in both
Sand mining	13	Eight of the sand miners also undertake agricultural activities, either subsistence or commercial
Brickmaking	34	Six of the bricklayers also undertake agricultural activities, either subsistence or commercial
Total	**131**	

Source: Mott MacDonald

The most vulnerable and sensitive of the displacement affected households are those living below the international poverty line of USD 1.90 per day,[74] female and elderly headed households, and households with disabled members. In total, there are 62 AFs meeting at least one vulnerability criteria identified. These households will be entitled to a vulnerability allowance as part of the LRP compensation entitlements.

The displacement-affected people are considered to have high sensitivity due to the high levels of poverty in the area, lack of other viable, employable skills, the informal and illicit nature of their activities (meaning that they are not entitled to compensation or support under national law)[75], and their dependence on the on-site livelihood as their main and often only source of income.

Based on results of the surveys conducted to date, displacement is expected to directly affect 131 households across nine LAI villages and will affect their resilience and wellbeing, given the scarcity of viable livelihood opportunities in the area. Further survey work will need to be undertaken to identify 100% of affected land users and households. The impact will be permanent. As a result, the magnitude of impact is considered to be moderate. This has therefore been identified as a **major adverse** effect which is **significant** prior to mitigation.

The effect will be mitigated through the implementation of the LRP. The LRP process will aim to use displacement as a development opportunity to provide livelihood and other benefits for the affected households, especially the most vulnerable, to enable them to maintain or improve their quality of life and livelihoods compared to pre-Scheme levels.

Additional residential and business structures located directly adjacent to the boundaries may experience physical and/or economic displacement depending on finalisation of the Scheme design and boundaries.

[74] Purchasing Power Parity (PPP) per capita per day. The national poverty line ranges from US$0.88 to US$1.04 2005 PPP per capita depending on the region. However given that the national poverty line has not been updated since 1993, the World Bank considers this to be a poor indicator of current poverty rates. Thus the international poverty line is applied for this Scheme. http://pubdocs.worldbank.org/en/381951474255092375/pdf/Uganda-Poverty-Assessment-Report-2016.pdf

[75] Under Ugandan law, compensation is only provided to individuals with legal ownership or usage rights over the land, as further detailed in the LRP

- Residential and businesses situated along the Kampala to Jinja Road, located between the boundaries of the South A and South B Sectors, within the village boundaries of Kireku Railway, Koolo-Buwanyi and Nantabulirwa.
- Residential structures on the western border of South B Sector within Kireku Main and Namataba villages. This is inclusive of the ongoing court case between the Kireku Main local council's chairman and KIBP, concerning the disputed boundaries of the KIBP border in the village.
- Residential and business structures on the southern border of North A Sector, in Mawotto village.

These receptors are excluded from the scope of this assessment as this is only based on current design, thus the precise number of potentially affected structures is unknown at this stage. Further analysis of displacement and livelihood impacts within the current and final boundaries will be needed once design freeze has been reached.

12.4.2.2 Loss of access to provisioning ecosystem services

Closure of the site to public access will affect access to provisioning ecosystem services located in the site. These include spring wells used as the main source of household water supply by five villages, and grasslands used for cattle grazing by households in five villages. These are in addition to the land, sand and clay materials used for livelihood activities as detailed in section 12.4.2.1 above. The resources are key materials required for livelihood activities, for which access will permanently restricted for the users due to the Scheme. Additionally, some of the resource users also lack viable and accessible alternative options. For these reasons they are identified as priority ecosystem services.

Several villages are dependent on the spring wells within the KIBP site as their sole source of water as shown below in Table 12.11. For three villages (Kireku Main, Namataba and Koolo-Buwanyi), the respective business on whose plot the spring well is located has committed to providing an alternate, accessible source of water. The worst-affected villages are Kazinga Main and Degeya as they have no alternative source of water, and the relevant business has not yet formally committed to providing an alternate source of water.

Table 12.11: Households affected by loss of access to spring wells

Village	Number of households affected	Location of affected well	Alternative source of water available?	Has business committed to providing alternate source of water?
Kazinga Main	400-500	North	No	No
Degeya-Ssenyi	270	South C	No	No
Kireku Main	1,500	South B	Yes	Yes
Namataba	10,000	South B	No[76]	Yes
Koolo-Buwanyi	400	South C	No	Yes

Source: Mott MacDonald

The villages whose residents are affected by the loss of access to grazing land are identified in Table 12.12 below. An approximate number of affected households is provided based on estimates of the villages' local council members, as a comprehensive household survey was not conducted with the village households and all users of grazing land.

[76] Namataba is a village that is spread out over a large geographical area. One portion has access to National Water services and other spring bores, while the other side is reliant on the spring well situated within the KIBP site

Table 12.12: Villages affected by loss of access to grazing land

Village	Approximate # of households affected	Location of affected land	Alternative source of land available?
Kireku Railway	14	South A	No
Namilyango	20	South C	Yes
Degeya-Ssenyi	10	South C	Yes
Namataba	Unknown	South B	Yes
Koolo-Buwanyi	Unknown	South C	Yes

Kireku Railway located within the South A sector is the most affected with the greatest magnitude, as the north-western area (where South A is situated) of the site is more heavily urbanised with few alternative green spaces available to use as grazing land. In contrast, Namilyango, Degeya, Koolo-Buwanyi in the eastern area and Namataba in the south-west are able to access National Forest Reserve lands, and as such the impact of loss of access to the Scheme area is less severe.

The affected users of spring wells in Kazinga Main and Degeya-Ssenyi, and users of grazing land based in Kireku Railway, are considered to have high sensitivity due to the high levels of poverty in the area, high level of dependence on subsistence agriculture, and lack of viable alternate sources of water or cattle grazing land. The magnitude of impact is moderate given that it will affect the wellbeing of multiple households across several villages. Thus, this is identified as having a **major adverse** effect that is **significant** prior to mitigation.

In comparison, for the villages where businesses have committed to providing alternate sources of water (Kireku Main, Namataba, and Koolo-Buwanyi), as well as the villages who have alternative sources of grazing land available nearby (Namilyango, Degeya-Ssenyi, Namataba and Koolo-Buwanyi), they have low sensitivity given the availability of alternate sources of these priority ecosystem services. The magnitude of impact is minor given that the disturbances that it will create will be short-term, as the affected households will be able to relocate to the other sources of water and land. Thus, this is identified as a **minor adverse effect** that is **not significant** prior to mitigation.

The impacts will be mitigated through appropriate management planning as detailed in Section 12.4.5, including:

- Community investment plan with details on development initiatives to be implemented to benefit the LAI villages, including social interventions that will provide specific support or benefit to the households losing grazing land access;
- Stakeholder engagement plan with details on ongoing communication to be conducted to follow up on affected villagers' access to alternative ecosystem services, following restriction of the KIBP site access; and
- E&S policy that all KIBP businesses must commit to, that requires them to maintain public access to existing spring wells in their plots, or provide an accessible, alternative source of water for affected villages.

12.4.2.3 Temporary Employment Generation

Construction phase employment is expected to start March 2020 with a peak workforce of 500 to 600 within the first 12 months of construction creating temporary contract-based employment for an estimated 600 people. The majority of opportunities will be for unskilled workers with fewer skilled technical and managerial jobs. Unskilled roles will include construction labourers and the provision of services for workers such as food and refreshment, sanitation and hygiene.

This employment generation will result in the provision of income for workers and their families contributing to their wellbeing and enhancing their quality of life. Migrant workers (expected to be sourced from other parts of Uganda) will send remittances to their families thereby injecting money into other localities. Jobs for local people will contribute to poverty reduction in the AoI.

This is particularly the case when vulnerable local people are employed, such as those who are part of displaced households and those with disabled family members. Although these jobs will be temporary, the skills and experience gained will improve future job prospects as local people will develop new and, or enhance existing, skills.

The outcome is that greater livelihood security will be provided to local people, particularly for those living in poverty, in an area that is dependent on subsistence agriculture and characterised by seasonal livelihood shocks. This is especially relevant in Uganda where the financial wellbeing of agricultural households is dependent on volatile climatic conditions. Indirect socioeconomic benefits will result from local workers' earnings being spent on local goods and services.

There may also be opportunities for higher-skilled roles for local candidates. Local recruitment activities will be detailed as part of a local recruitment plan (as detailed in Section 12.4.5.10). Local governmental authorities have expressed their belief that expatriate workers are being favoured over local candidates for higher-skilled roles, and that there is a lack of local ownership over managerial roles at the existing businesses in the KIBP. Efforts to upskill local individuals such as recent graduates will be applied to maintain positive community relations and create a multiplier effect of increased household incomes in local communities.

The local beneficiaries of the construction jobs are considered to be of medium sensitivity because there is a high level of local poverty and dependence on subsistence agriculture and other low-wage employment. Most of the jobs will be temporary for upwards of 600 people, which will not comprise a 100% local workforce, so the impact is expected be of minor beneficial magnitude. Therefore, the construction employment is expected to have a **moderate beneficial** effect, which is **significant**.

12.4.2.4 Labour and Occupational Health and Safety Risks

Site preparation and construction activities will pose risks to the occupational health and safety of workers if not managed appropriately. Although not independently verified, claims of poor labour and OHS practices received by local governmental authorities, in addition to the prevalence of poor practices at the national level (as detailed in Section 12.3.4), lead us to predict that the Scheme will expose construction workers to the following risks and hazards:

- Likely high number of occupational injuries as a result of inadequate PPE and OHS training, excessive overtime hours, and the prevalent unsafe construction culture and practices;
- Likely contravention of workers' rights as defined in Ugandan labour laws and International Labour Organization (ILO) Core Labour Standards[77] as a result of:
  - Absence of written work contracts, inadequate retrenchment procedures and the lack of protection for casual labourer; and
  - Delayed or insufficient salary payments.

The following general health and safety risks and hazards typical of all infrastructure construction sites will also need to be carefully managed and mitigated:

- Physical hazards from use of heavy equipment including cranes and electrical hazards from the use of tools and machinery;
- Trip and fall hazards, and falling objects;
- Dust, noise, vibration and hazardous and/or explosive materials and chemicals;
- Working at height;
- Live power equipment and lines and electro-magnetic fields; and

[77] Uganda has ratified all eight conventions comprising the Core Labour Standards, including: C029 - Forced Labour Convention, 1930 (No. 29); C087 - Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87); C098 - Right to Organise and Collective Bargaining Convention, 1949 (No. 98); C100 - Equal Remuneration Convention, 1951 (No. 100); C105 - Abolition of Forced Labour Convention, 1957 (No. 105); C111 - Discrimination (Employment and Occupation) Convention, 1958; C138 - Minimum Age Convention, 1973 (No. 138); C182 - Worst Forms of Child Labour Convention, 1999 (No. 182)

- Exposure to extreme heat during summer.

Construction workers are considered to be of medium sensitivity due to lack of adequately enforced labour and OHS protection in Uganda and comparatively high rates of work injury and fatalities. The impact would last for the duration of the construction phase for an approximate total of 600 workers, so the impact is expected be of moderate adverse magnitude. Therefore, the impact of construction employment is expected to have a **major adverse effect** that is **significant** prior to the application of labour and OHS management and monitoring mitigation. This mitigation as detailed in Section 12.4.5 will also be applied to the monitoring of sub-contractors, so that all works are carried out in accordance with Ugandan law and good international industry practice.

12.4.2.5 Increased Revenue for Local and Regional Businesses and Governments

The presence of a large construction workforce based at the site will result in the indirect impact of increased revenue for local and regional businesses. This includes petty traders selling goods and services along transport link roads and site boundaries, and transport providers including boda boda and minibus operators. Additionally, the construction works present a variety of procurement opportunities for businesses in the WAI, such as suppliers for catering, commodities and natural resources. Although child labour presents a very low risk in this context, particular attention will need to be paid to verify that child labour is not being undertaken in the service and industrial sectors that comprise the KIBP's primary supply chain.

The beneficiaries are considered to be of low sensitivity as the businesses are existing operations that are not dependent on the KIBP as their sole source of income. The impact is expected to be minor as different suppliers and businesses would be used for specific, varied and temporary procurement and customer needs throughout construction. As a result, the impact of increased revenue is expected to have a **minor beneficial** effect that is **not significant**.

12.4.2.6 Scheme Induced In-Migration

Throughout the ESIA consultations, municipal and village authorities expressed concerns relating to in-migration of jobseekers seeking employment at the current operational factories within the KIBP site, and the resulting impact on availability of affordable housing and quality of public facilities.

Similar in-migration of jobseekers into the LAI and WAI may occur due to the job opportunities presented by the infrastructure works, as well as the additional businesses that will be based on site following completion of the construction works. The highest rates of in-migration will occur during the construction phase when labour requirements are highest and most diverse, and when the KIBP works will make the greatest contributions to the local economy. The magnitude of the expected influx has been assessed in Table 12.13.

Table 12.13: Assessment of magnitude of influx

Factor	Expected magnitude of migration impacts for this Scheme
Scale of project (project construction and operation, labour goods and services)	**Moderate** – The Scheme will affect a large WAI over a multi-year construction period and with a moderately large construction workforce of 600.
Area capacity to meet project needs/population density of project area	**Moderate** – area is mostly peri-urban with basic service provision, with some villages reporting challenges in provision of adequate health facilities and affordable housing due to migration of jobseekers for existing KIBP factory jobs. There is moderate capacity to meet the demands of an increased population
Tendency towards concentration of populations	**Moderate** – Populations are dispersed throughout various villages, however certain villages such as Kireku Railway have been hotspots of migration and have a high concentration of project-related worker population (likely due to good transport links)
Opportunities for compensation and benefits speculation	**Low** – Few opportunities are expected. Compensation for economic displacement is already anticipated for limited number of households. Benefits are relatively limited, although the ESIA proposes ways to enhance benefits.

Factor	Expected magnitude of migration impacts for this Scheme
Proximity to large population centres	**Low**– the Scheme is within 11km of Kampala, therefore it is expected that some of the influx will occur in these urban centres and lessen impacts in the WAI.
Overall Conclusion	**The magnitude of the rate of influx is expected to be moderate**

Residents of the LAI have medium sensitivity. Although they have some capacity to absorb population growth in their villages, and households are generally dispersed throughout the AoI, they have limited capacity to seek alternate housing and services given the high poverty rates. The impact is expected to be moderate as per the assessment shown in Table 12.13. As a result, Scheme-induced in-migration is expected to have a **major adverse effect** that is **significant**.

12.4.2.7 Traffic and Other Community Health and Safety Impacts

Increased construction traffic will be the most significant community health and safety impact on the local population. Scheme truck and vehicle movements will increase existing traffic volumes and increase risks for traffic accidents. Table 12.14 below details the forecast traffic volumes on the Kampala-Jinja Road, the key route to be used for Scheme transport. The Bweyogerere-Mukono section, most of which is located in the LAI, is expected to increase by 129% from 2020 to 2030.

Table 12.14: Old Kampala-Jinja Road Forecast Traffic Volumes (vpd)

From	To	Length (km)	2020	2030
Kampala	**Kenya Border**			
Kampala	Bweyogerere	6.5	85,898	197,037
Bweyogerere	*Mukono*	*10.8*	*50,273*	*115,319*
Mukono	Lugazi	24.2	16,483	34,411

Source: Pre-Feasibility Study for Strengthening and Improvement of Sections of the Northern Corridor Route (Malaba – Kampala – Katuna) EU Framework Contract. July 2007

The disabled, poor and elderly are most vulnerable to traffic accidents, given their reliance on walking along such major roads as the primary means of transport. This will particularly affect those residing in villages located along the major access roads as follows:

- Kampala-Jinja Road: Kazinga Main, Kireku Railway, Mawotto, Kiwanga Lwanda and Nantabulirwa; and
- Old Kampala-Jinja Road: Kireku Railway, Kireku Main and Koolo-Buwanyi.

Other community health and safety risks that will be mitigated through construction phase measures include:

- Harm caused through use of inadequately verified, trained and monitored security personnel who may inappropriately use force and/or weapons and commit petty crime on site. A total of 30 to 40 security staff is expected to be engaged on the KIBP site throughout the construction and operations phases;
- Gender-based violence (GBV)[78] and family breakdowns, resulting from the proximity of the migrant construction workforce to local host population and the pressures of anti-social shift work;
- Resource conflict between the local host population and migrant labour force. This could have an impact on availability of affordable housing and health services;

[78] GBV is defined by the IFC as: “an umbrella term for any harmful act that is perpetrated against a person’s will and that is based on socially ascribed gender differences. GBV includes acts that inflict physical, mental, sexual harm or suffering; threats of such acts; and coercion and other deprivations of liberty, whether occurring in public or in private life. GBV disproportionately affects women and girls across their lifespan and takes many forms, including sexual, physical, and psychological abuse. It occurs at home, on the streets, in schools, workplaces, farm fields, and refugee camps; during times of peace as well as in conflicts and crises.” (‘IFC Good Practice Note: Addressing Gender Based Violence in Investment Project Financing involving Major Civil Works’, 2018)

- Increased incidence of sexually transmitted infections (STIs) including HIV/AIDs among the workforce and surrounding communities, due to a large temporary workforce staying in the area without family and increase in the cash economy from Scheme-related wages. The risks are exacerbated by the prevalence of sex work within nearby transport routes and hotspots, such as the Kireka township in Kira Municipality in the Scheme's WAI; and
- Cultural conflict and tension associated with interaction between the workforce (and local communities, due to different cultural norms, practices and beliefs.

Other potential impacts that will need to be mitigated include nuisance impacts from increased noise, vibration, dust and exhaust emissions related to construction activities (see Chapters 5 Air Quality and 11 Noise for more details).

A potential beneficial impact concerning security is the increase in lighting in the area and increased security personnel patrolling the site and its boundaries for the construction phase. This will lead to greater safety and security in the area for local pedestrians provided that there is appropriate oversight of security personnel's performance and behaviour.

The residents of the LAI villages are considered to be of medium sensitivity to community health, safety and security impacts due to their proximity to the construction activity and the prevailing poor health and safety culture. As the communities are generally low-income, many travel along main roads via foot, therefore exposing themselves to traffic risks. Those living closest to and immediately adjacent to the site and the access roads are at most risk.

Risks would be increased for the duration of the construction phase and the overall community health and safety impact is expected be of moderate adverse magnitude, and therefore is anticipated to have **major adverse** effect that is **significant**. These community safety impacts, effects and risks will be mitigated through an effective health and safety management system and security management plan (as discussed in Section 12.4.5).

12.4.2.8 Severance of Access Routes Across the Site

The construction phase will see the restriction of public access to construction areas on site, which may accordingly restrict access to the public pathways. The pedestrians are considered to be of low sensitivity given that there are alternative routes to reach other villages, although they may require longer commutes. The impact would be temporary, lasting for duration of the construction phases, and the affected pedestrians are expected to be able to adapt to alternative access routes so the impact is expected be of minor magnitude. Therefore, the impact is expected to have a **minor adverse** effect**,** which is **not significant**.

12.4.2.9 Raised Expectations for Opportunities, Resulting in Increased Community Frustrations

Governmental and community stakeholders have emphasised the KIBP's important role in undertaking community investment and corporate social responsibility activities as a major economic player in the region and country. Suggested investments include expanding green space available in the area, providing public recreational areas, and funding infrastructure improvements such as for schools and health centres. They also have high expectations of job creation and upskilling for local community members by prioritising local candidates for both low- and high-skilled positions and technical training opportunities. There is an additional expectation that good labour and OHS standards will be applied uniformly throughout all KIBP businesses.

Failure to adequately manage expectations and communicate realistic prospects about the number of jobs available to local community members, and the types of community investment and support that can be provided by the Scheme, can lead to adverse impact on community relations, and reputational risk and loss of social licence to operate as a result.

As there are existing expectations around the Scheme's beneficial impacts and contributions to the local communities, the local villages are considered to have medium sensitivity. The impact is expected be of minor magnitude given that this is a potential risk that can be mitigated through appropriate community investment and stakeholder management planning. Therefore, the effect is expected to be **moderate adverse** which is **significant**.

12.4.3 Operation Impacts

12.4.3.1 Direct Employment Generation

The operational phase is expected to generate direct employment opportunities through an unconfirmed number of skilled jobs. Some roles such as office staff are expected to be performed by the same personnel as hired in the construction phase, so the actual number of new jobs created may be slightly lower. These will be mainly permanent jobs and the beneficiaries will overall be migrant workers (skilled Ugandans or expatriate workers) as a result of the shortage of required skills in the LAI. Some non-technical jobs that local workers would benefit from include security, administration, catering and driving.

Most of these job-seekers are considered to be less sensitive than the local population due to their higher level of livelihood capital in terms of education, skills and income earning potential. Most are also likely to be wealthier than most local people and are therefore considered to be of low sensitivity. The impact is of minor magnitude since the jobs will be long-term or permanent positions but affect fewer people than in the construction phase. The effect overall is expected to be **minor beneficial** which is **not significant**.

Upskilling of local candidates to provide more operational job opportunities for local community members will be addressed in the local recruitment plan described in Section 12.4.5.10.

12.4.3.2 Increased Revenue for Local and Regional Businesses and Governments

The KIBP site will have a total of 242 businesses in operation following construction works, with 20,000 workers on site across the individual businesses during full operation.[79] This will have a multiplier effect of 26,400 indirect jobs (employment created as an indirect consequence of the presence of this KIBP workforce) being created in the WAI.[80] The UIA is also expected to enter into concession contracts with various businesses for delivery of services and products on site, including for third-party warehousing and cold storage facilities, retail services and security services. As local households who will benefit from the expected indirect jobs currently have other sources of income, they are considered to have low sensitivity. Given that this will impact thousands of households and last for the duration of the KIBP Scheme life, the impact is considered to be of moderate magnitude.

The operational KIBP site will also result in increased tax revenue paid by businesses to local authorities, thus contributing to the economic performance of the Wakiso and Mukono Districts. However, it is not possible to accurately assess the direct impact of this additional revenue on the two districts' income and expenditures, and the residents' wellbeing. The impact of increased revenue in terms of tax revenue is expected to be of minor magnitude.

Overall, impact of increased revenue through indirect job creation and tax revenue is considered to have a **moderate beneficial effect** which is **significant**.

12.4.3.3 Improved Roads and Accessibility

Following construction works and the start of the operations phase, several improvements will have been made to the Kampala-Jinja Road and Old Kampala-Jinja Road, shown in Figure

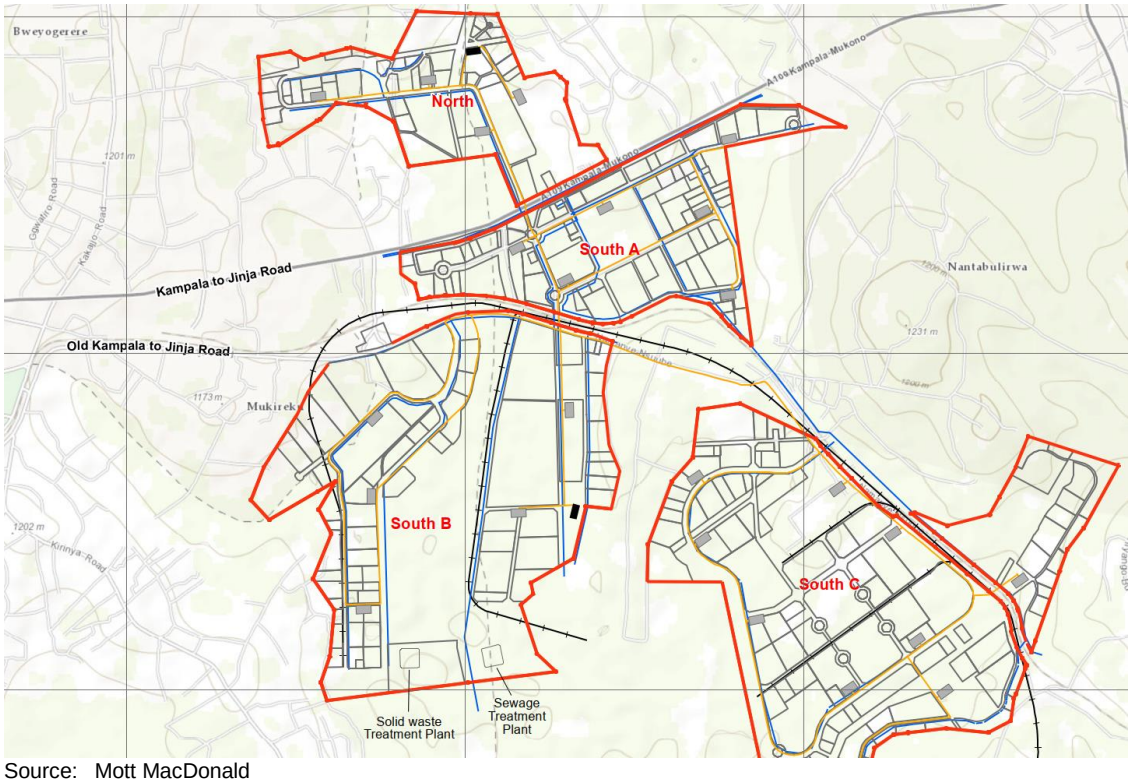
[79] Among these, 30 are currently operational, 82 are in construction and 130 are in the pre-construction stage

[80] Based on UK Homes & Communities Agency methodology used to calculate ratio of rates for direct jobs to induced jobs (rate of 1.32) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/378177/additionality_guide_2014_full.pdf

12.11 below, as part of the project scheme to enable greater ease of movement of vehicles (detailed in Chapter **Error! Reference source not found.**). This will improve LAI residents' (both motorist and pedestrian) access to larger administrative centres like the municipal and district headquarters and the wider Kampala urban centres, which will in turn reduce travel time to health posts, employment and local markets. Given that all 12 LAI villages make use of the main thoroughfares of Kampala-Jinja Road and Old Kampala-Jinja Road, the impact will affect residents throughout the communities. Improved road conditions will also reduce risk of injuries for pedestrians, commuters and motorists arising from dirt roads that become flooded and muddy following rain.

The LAI population is heavily-reliant on travel by foot, 'boda boda' or minibus. The sensitivity of the local pedestrians and motorists residing in the villages adjacent to the main roads to such positive impacts is considered medium. The magnitude of the impact is considered negligible, as the improvements to be made (including separate junctions and widening of the roads) will be limited to certain portions of the roads. The positive impact may also be offset by the increase in traffic from the Scheme transport and commute of workers to site as referenced in Chapter **Error! Reference source not found.**. The effects of this are therefore considered to be **minor beneficial,** which is **not significant**.

Figure 12.11: Location of the Kampala-Jinja Road and Old Kampala-Jinja Road in relation to Scheme site



Source: Mott MacDonald

12.4.3.4 Traffic Impacts on Local Residents, Pedestrians and Motorists

Increased traffic movement during the operations phase will lead to higher risks for traffic accidents for pedestrians and motorists either residing in or passing through the same villages affected by construction traffic (see Chapter **Error! Reference source not found.**). The current assessment of traffic in the operations phase assumes the following vehicle movements:

- 10,000 operational workers travelling to site using public transport in the form or minibuses (12 seater minibuses) which would lead to approximately 834 one way and 1670 two-way journeys per day (on the basis of 20,000 workers in the KIBP overall).

- 9,000 trips per day of heavy goods vehicles which would be 18,000 two-way journeys.

The LAI villages who use the same roads as the planned Scheme vehicle movements comprise both pedestrians and motorists, who are considered to be of medium sensitivity to traffic hazards. As the communities are generally impoverished, many people travel along main roads via foot, thus particularly exposing themselves to traffic risks. Risks would be present throughout the operations phase and are expected be of moderate adverse magnitude. Therefore, the impact of increased traffic movement is expected to have a **major adverse** effect that is **significant**.

12.4.4 Summary of Construction and Operation Impacts

A summary of the potential socioeconomic impacts prior to the application of mitigation and benefit enhancement measures are shown in Table 12.15. This table does not include secondary impacts covered in other sections. Those that are moderate or major are considered significant. There are seven significant adverse and three significant beneficial effects expected in the construction phase.

Table 12.15: Summary of significance assessment of potential effects pre-mitigation

Receptor	Summary of impact	Permanent / Temporary	Adverse/ beneficial	Magnitude	Sensitivity	Impact evaluation	Significance
Construction phase							
Informal land users of KIBP site	Economic displacement	Permanent	Adverse	Moderate	High	Substantial adverse	Significant
LAI village households in Kazinga Main, Degeya-Ssenyi, Kireku Railway	Loss of access to provisioning ecosystem services (water sources, grazing land)	Permanent	Adverse	Moderate	High	Substantial adverse	Significant
LAI villages Scheme workers	Temporary employment generation	Temporary	Beneficial	Moderate	Minor	Moderate beneficial	Significant
Scheme workers	Labour and occupational health and safety risks	Temporary	Adverse	Moderate	Medium	Major adverse	Significant
Local and regional businesses WAI	Increased revenue for local and regional businesses	Permanent	Beneficial	Minor	Low	Minor beneficial	Not significant
LAI villages	Scheme-induced in-migration	Temporary / Permanent	Adverse	Moderate	Medium	Major adverse	Significant
LAI villages	Traffic and other community health and safety hazards	Permanent	Adverse	Moderate	Medium	Major adverse	Significant
LAI villages	Pedestrian severance of access routes	Permanent	Adverse	Minor	Low	Minor adverse	Not significant
LAI villages	Raised expectations for opportunities, resulting in increased community frustrations	Permanent	Adverse	Minor	Medium	Moderate adverse	Significant
Operational phase							
LAI villages KIBP workers	Direct employment generation	Permanent	Beneficial	Minor	Low	Minor beneficial	Not significant
Local and regional businesses WAI	Increased revenue for local and regional businesses and governments	Permanent	Beneficial	Moderate	Low	Moderate beneficial	Significant
LAI villages (Kazinga Main, Kireku Railway,	Improved roads and accessibility	Permanent	Beneficial	Negligible	Medium	Minor beneficial	Not significant

Receptor	Summary of impact	Permanent / Temporary	Adverse/ beneficial	Magnitude	Sensitivity	Impact evaluation	Significance
Mawotto, Kiwanga Lwanda, Nantabulirwa, Kireku Main, Koolo-Buwanyi)							
LAI villages	Traffic impacts on local residents, pedestrians and motorists	Permanent	Adverse	Moderate	Medium	Major adverse	Significant

12.4.5 Mitigation Measures

12.4.5.1 Overview

This section discusses the mitigation and benefit enhancement measures that will be used to avoid, mitigate, manage and improve the socioeconomic impacts identified. Various measures to mitigate environmental impacts (noise, vibration, dust, waste generation, traffic movements) that could cumulatively lead to construction nuisance are addressed in other specialist chapters.

12.4.5.2 Environmental and Social Management Plan (ESMP)

The ESMP will detail the social, community and labour sub-management plans – or requirements to produce them – to be passed down to the Engineering, Procurement and Construction (EPC) contractor. An ESMP will be developed for both the construction and operations phases. For the operations phase, the Scheme sponsor will be responsible for fulfilling the requirements of the ESMP. The ESMPs will covering the following topics:

- Labour management and working conditions, namely a project commitment related to upholding labour rights (that all Scheme employers will be required to adhere to through contract clauses), workers' Code of Conduct, workers' grievance mechanism, construction labour monitoring, local content and recruitment plan, and measures to increase women's participation within the workforce during construction and operational phases;
- Traffic management plan with details on how safe pedestrian access routes will be developed and secured alongside major thoroughfares and access roads, and how workers' road safety awareness will be maintained;
- Security and safeguarding of Scheme personnel, property and communities; and
- Influx management strategies (incorporated across the employment and procurement policy, stakeholder engagement plan, community health, safety and security plan, community investment plan, security plan and livelihood restoration plan).

The ESMP will cross-reference to the other thematic plans and measures identified in the following sections.

12.4.5.3 E&S Policy

An E&S policy will be developed for the Scheme that all KIBP contractors and businesses must commit to, in recognition of their responsibilities regarding impact of business operations on the Scheme AoI's environmental, health and safety and social conditions. The policy will include an overarching statement of the E&S objectives and principles for the Scheme to follow, including the following provisions:

- Comply with all the applicable environmental, health & safety laws, regulations and IFC Performance Standards;
- Prioritise health and safety of all personnel including subcontractor personnel;
- Conduct business activities in an environmentally and socially responsible manner with full respect of the environment and of the local and regional communities;
- Develop and maintain specific and measurable E&S objectives/targets, and appropriate procedures to incorporate and improve upon them;
- Avoid over-consumption of energy and natural resources, and minimise the usage of non-renewable resources and the emission of greenhouse gases;
- Take all reasonable initiatives to minimise pollution of the environment; and

- Establish and maintain appropriate mechanisms for communication and consultation of relevant E&S issues with contractors, sub-contractors and external stakeholders.

The policy will include a commitment for all businesses to maintain public access to existing spring wells in their plots, or provide an accessible, alternative source of water for affected villages. The alternatives will be provided prior to development of the allocated land plot for industrial use and restriction of public access.

This policy will be disclosed to all contractor, subcontractor and service provider workers and other stakeholders, and made available upon request.

12.4.5.4 Livelihood Restoration Plan (LRP)

In addition to efforts to avoid and minimise displacement impacts through the scheme design, a LRP will be used to mitigate livelihood displacement impacts.

A preliminary LRP has been developed to accompany submission of this draft ESIA (Volume IV), with the overarching aim to ensure that displacement-affected people's standard of living and livelihoods is at least restored, or where possible improved, so that it is addressed as a development opportunity.

This LRP describes the eligibility criteria, entitlements for compensation and livelihood restoration, compensation methodology, and income and livelihood restoration strategies. The data obtained has been extrapolated to conduct a qualitative analysis of the anticipated socioeconomic characteristics and assets for the remaining households, identify the sensitivity of affected peoples and enable a baseline vulnerability profile of the affected households.

Opportunities and constraints for livelihood restoration, diversification and other community development outcomes are defined. The plan also describes the grievance management process, proposed monitoring and evaluation framework and provides an estimate of the compensation packages and proposed budget for the LRP.

Following submission of this draft ESIA and preliminary LRP, a full implementation-ready LRP will need to be prepared once the scheme design has been finalised. This will provide a detailed and quantified assessment of economic displacement for all affected households and businesses within the finalised Scheme boundaries, based on household socioeconomic and asset survey data collected for a 100% sample of the affected people.

An outline Terms of Reference (ToR) for the development of a full LRP to meet national and international requirements is provided in the preliminary LRP. The capacity of the LRP implementation teams will be critical to success, and provisions for training and capacity building are provided in the LRP so that so that capacity constraints are not an insurmountable barrier to achieving the desired development outcomes.

12.4.5.5 Stakeholder Engagement Plan (SEP)

The Stakeholder Engagement Plan (SEP) included as a technical appendix to this ESIA (see Volume IV) will be updated for the construction and operational phases of the Scheme. The SEP has been designed to manage stakeholder and community relations, expectation, and grievances through consultation and disclosure mechanisms, based on the principles of respectful and meaningful dialogue. It includes specific provisions to enable the active participation of vulnerable populations in the consultation activities.

12.4.5.6 Community Investment Plan

A needs-based community investment plan (CIP) will be developed and implemented as a mechanism to share Scheme benefits with locally affected communities. It will aim to help mitigate the adverse impacts of Scheme-induced in-migration, and local livelihoods impacts, and will be aligned with the LRP. It will provide opportunities for improved community infrastructure, health and education services so that benefits are shared with locally affected people through the Scheme contributing to addressing local poverty and development needs.

The CIP will include consideration of measures such as:

- Agricultural extension support: for LAI households who use grazing land in the KIBP site, through activities such as training, establishment of cooperatives, provision of micro-credit, provision of agricultural inputs (seeds, tools) and modern ploughing and harvesting techniques. The objective would be to increase yields and opportunities for small-scale commercial agriculture with a diversity of crops, so that people are less dependent on subsistence and livestock livelihood strategies and less susceptible to impacts of reductions in grazing land;
- Vocational skills development: technical training of recent graduates with potential opportunities for recruitment into KIBP operation activities;
- Public infrastructure: such as construction of recreational and market facilities, improvements of existing health centres and schools and provision of equipment and furniture. This will have the additional aim of mitigating impact of Scheme-induced influx of jobseekers on the quality and availability of public facilities; and
- A commitment that all KIBP businesses will be required to follow, to maintain public access to existing spring wells in their plots, or provide an accessible, alternative source of water for affected villages. The alternatives will be provided prior to development of the allocated land plot for industrial use and restriction of public access.

Potential opportunities to partner with local NGOs and Community-Based Organisations (CBOs) with local ties to the LAI villages will be reviewed as a strategy for implementation. Potential annual disbursement budgets will be ringfenced for community investment.

The specific community investment activities will be developed through consultation with the LAI villages and affected households about their priorities and needs. The CIP will be aligned with the SEP, community health and safety plan, local recruitment plan and the livelihood components of the LRP.

The CIP will include monitoring against clear key performance indicators. Should an annual disbursement budget be established, annual revisions made to the CIP will use monitoring results to feed into the budget allocation process each year. This will be conducted for a period of time to be determined through consultations and discussions between the UIA and relevant stakeholders.

12.4.5.7 Human Resources Policy

A Scheme-specific Human Resources (HR) policy will be developed by the Scheme sponsor or EPC contractor, and all subcontractors required to apply it and provide it to workers. The main objective will be to ensure efficient and fair management of workers in compliance with requirements of Ugandan labour laws and international good labour practice. It will include policy statements relating to the following topics:

1. Working conditions and management of worker relationships:
   a. HR policy;

   b. Working relationship;
   c. Working conditions & terms of employment, including working hours, wages, leave and benefits;
   d. Workers' organizations, freedom of association and collective bargaining;
   e. Non-discrimination & equal opportunity;
   f. Retrenchment; and
   g. Grievance mechanism.
2. Protecting the workforce through prohibition of:
   a. Child labour;
   b. Forced labour; and
   c. Harassment and abuse.
3. Occupational health & safety;
4. Workers engaged by third parties; and
5. Supply chain.

12.4.5.8 Labour Management Plan

The labour management plan will be developed for the construction phase by the EPC contractor and all subcontractors to follow. The plan will establish how Scheme workers are to be managed, in accordance with the requirements of national law and international standards.

Provisions of the plan will include but not be limited to the following requirements for all to follow:

- Base employment decisions on principles of non-discrimination and equal opportunity, in particular fair and equal pay, especially for women carrying out the same work as men;
- Produce job descriptions and provide written contracts and other information that outline the working conditions and terms of employment, including the full range of benefits;
- Have worker contracts in place prior to mobilisation of the workforce. Worker contracts shall comply with the ILO commitments and IFC Performance Standard 2 and include clear statements on working conditions and terms of employment, including overtime arrangements and the timely payment of wages;
- Ensure no workers are charged fees to gain Scheme employment;
- Inform workers about the grievance mechanism prior to commencement of work. Furthermore, there should be regular refresher awareness raising of the worker grievance mechanism and toolbox talks on workers' rights;
- Report regularly on key labour performance indicators. This may include (but not limited to):
  – Number of skilled/unskilled workers recruited per gender and local communities;
  – Hours worked (regular and overtime) during period and cumulatively, hours lost;
  – Number and type of accidents, near misses, site audits and meetings, trainings;
  – Details of any worker grievances; and
  – Details of any stakeholder grievances in relation to workers or security measures.
- Organise a training program and keep training registers for workers;
- Provide all workers with a summary declaration of their employment service and training activities at the end of contract as a means to finding continued employment;

- Establish occupational health and safety procedures that provide workers with a safe and healthy work environment;
- Ensure acceptable conditions of work including by observing national statutory requirements related to minimum wages and hours of work, and meet international standards of not employing any persons under the age of 16 for general work and no persons under the age of 18 for work involving hazardous activities;
- Meet international standards related to paying all wages, including bonuses and premium pay for overtime work, in a timely fashion and in a manner consistent with ILO Convention 95; and
- Commit to not taking any action to prevent employees from exercising their right of association and their right to organise and bargain collectively.

12.4.5.9 Worker Code of Conduct

A worker code of conduct will be developed, and all workers employed on the site required to sign it. It will regulate health and safety practices in the workplace and behaviour in local communities to be respected at all times.

To mitigate risks of conflict between local host communities and the construction labour force, provisions for behaviour in the local communities will include worker commitments to:

- Not block roads or paths in a way that restrict public access, unless this is required for public safety or is authorised by your supervisor;
- When traveling by vehicle, abiding by speed limits and traffic laws, and be courteous to local residents. Try to limit noise and dust impact on pedestrians;
- When staying in local communities, respecting host and local customs, cultural norms and religious practices and act responsibly. Involvement in drugs, excessive use of alcohol, and prostitution and human trafficking will be avoided;
- Respect principles of gender equality and report incidences of GBV when encountered;
- Be aware of the risk of transmission of HIV/AIDS and sexually transmitted disease;
- Report illnesses and make use of Scheme medical support to treat illnesses before they spread;
- Avoid unnecessary damage to land, trees, structures, crops, and any property privately owned by people in the local area, and report accidental damage to your supervisor; and
- If local residents raise any complaint or concern about the Scheme or conflict with local communities is experienced, immediately report it to your supervisor.

Workplace-specific provisions will include worker commitments to:

- Participate in all mandatory safety training;
- Use appropriate PPE at all times in accordance with training provided on proper use;
- Only undertake work for which you are trained, competent and fit;
- Follow safety rules and procedures including the use of all relevant standards and instructions;
- Demonstrate safe working practices and stop any work that is potentially unsafe;
- Help to make sure that other people who work with you – employees, contractors and other third parties – follow the Scheme's safety rules and procedures;
- Not undertake work when your performance is impaired by illness, alcohol, or any other drug, legal or illegal, prescribed or otherwise;

- Not to consume alcohol and drugs, or bring firearms onto site;
- Not discriminate against anyone on the grounds of race, colour, religion, political conviction, gender, age, national origin, sexual orientation, marital status or disability. All forms of violence and harassment in the workplace including verbal, physical, sexual, or psychological abuse will be prohibited; and
- Exhibit professional behaviour and integrity at all times.

In support of the Code of Conduct, the Scheme will deliver awareness briefings to workers on host population norms, traditions and cultural sensitivities with emphasis on respecting local women. They will be conducted on a regular basis including during induction.

Induction training and briefings will also be provided on the steps to take if a grievance is raised by an external stakeholder, while posters with the relevant information will be available across the Scheme site.

12.4.5.10 Local Recruitment and Skills Development Plan

The contractor will commit to utilising local skills from within the LAI to the extent possible. If not available, the recruitment will be extended to the WAI comprising the Wakiso and Mukono Districts as secondary catchment areas.

The Local Recruitment Plan will aim to maximise job opportunities for local people, facilitate skills development of the local workforce and provide longer-term benefits to local people beyond the lifetime of the Scheme, therefore enhancing their future employability.

The Plan will include details on the following aspects:

- Means of disclosure of job opportunities to LAI villages (such as through the local village council leaders and job announcements at municipal offices);
- Prioritisation of livelihood displacement-affected households in recruitment (and this will be aligned with LRP specifications);
- Local employment rate target to be maintained for construction and operations phases;
- Process for local people hired on a short-term basis during construction to obtain permanent contracts during the operational phase; and
- Provisions to facilitate recruitment and upskilling of women and disabled candidates, and initiatives to encourage women and disabled candidates to apply for Scheme roles.

Skills development of local workers will also be detailed in the Plan, focusing on the following aspects:

- Identification of skills and labour needs;
- Existing skills capacity gaps and training demand analysis;
- Tailored skills development programmes in the construction phase, so that local workers are ready to take advantage of operational phase employment opportunities; and
- Selection process for participants of skills development programmes.

All on-the-job and technical training will be provided free of charge to workers employed by the contractor or subcontractors.

12.4.5.11 Local Content Strategy

The contractor will commit to encouraging the inclusion of local based companies (defined as those based in the WAI, or Wakiso and Mukono Districts) as well as national companies (based

in Uganda) in the procurement of appropriate services and equipment to the extent possible. A local content strategy will be developed and implemented during construction and operations to fulfil this commitment. The strategy will be structured through the following topics:

- Local Procurement Opportunities;
- Mapping Local Companies;
- Communicating Local Content;
- Pre-Qualification of Companies; and
- Strategies to Encourage Local Companies to Tender.

Strategies to facilitate local companies' participation in the Scheme supply chain can include:

- Unbundling procurement tender requests into smaller work packages;
- Providing tender documentation in local languages and free of charge;
- Organising longer contract periods to justify acquisition of capital equipment;
- Providing longer deadlines to assist small and medium enterprise response;
- Waiving or lowering performance bond requirements for local companies;
- Using serial contracts or framework agreements;
- Setting aside contracts or specific work packages that are only directed to local companies;
- Providing price preference as part of the tender evaluation; and
- Requesting tenders in local currency.

A full range of services from routine products (low profit impact and low sourcing risk) to strategic products (high profit impact and high sourcing risks) will be considered.

12.4.5.12 Retrenchment Plan

The contractor will develop a retrenchment/demobilisation plan one year before the start of operations, to anticipate any significant job losses resulting from the Scheme's transition from construction to operation. The plan will be prepared and implemented in line with national law and good industry practice and based on the principles of non-discrimination and will reflect consultation with workers and appropriate governmental agencies if applicable.

This plan should include:

- The reasons why job losses are necessary;
- The timescale and when notice of employment contract end will be given;
- What jobs are likely to be maintained during the operation phase and how best employees would be selected for the transition construction operation;
- How broader community impact issues are to be addressed; and
- Consultation process proposed with the workforce and the local authorities.

12.4.5.13 Occupational Health and Safety Plan

The Scheme will follow legislation and include contract clauses that require contractors to apply international standards related to OHS. Potential infrastructure design flaws will be mitigated through engineering good industry practice, modern and appropriate design and construction method statement use.

An OHS Plan will be prepared by the EPC contractor. The plan will detail the proper use of PPE by all workers and will ensure that PPE use is included in the workers' code of conduct. The

plan will set out the contractor's appropriately equipped first aid room and that staff are available to address workers' health.

The plan will put in place measures to encourage site safety including barriers, signage and sensitisation. The plan will include monitoring and reporting of all accidents, injuries, lost-time incidents, near misses and community interactions on health issues. It will also include preventative measures such as:

- Toolbox talks on hygiene and sanitation at least every six months
- Good housekeeping on site to prevent pooling of water, to ensure safe and appropriate waste and materials management and vehicle and equipment placement
- Control and quality assurance of drinking water
- Pest and vector control activities

The plan will provide information dissemination and sensitisation campaigns on venomous snakes directed to workers and provision of additional doses of snake and rabies serum to health facilities on site. It will ensure adequate portable toilets will be provided at all major work sites.

Preventive measures for HIV/AIDS will also need to be disclosed to workers through regular briefings. The contractor will be required to provide information and advice about testing and access to treatment and support. It will be the responsibility of the Contractor to source appropriate service providers of HIV/AIDS programming.

The implementation of health and safety related plans, procedures and training will allow the Scheme to aim for an accident rate of zero, especially accidents that could result in lost work time, serious injuries and fatalities.

12.4.5.14 Community Health and Safety Plan

A Community Health and Safety Plan will be developed and implemented by the contractor that is aligned with Ugandan laws and WB EHS best practice guidelines. It will cover but not be limited to the following areas:

- **Site access:** the site will be clearly demarked. External stakeholders will not be allowed to enter areas where blasting, excavations or other activities that are hazardous to public safety are being undertaken. There will be site registry system manned by security personnel and community members will have to sign in and out showing identification;
- **Traffic:** a traffic management plan will be prepared detailing measures to avoid specific local settlements and receptors. It will include speed restrictions through local settlements and avoid construction deliveries on local event days. The plan will include measures to reduce congestion caused by abnormal loads and their escorts and will look to transport and move large loads during night time. The plan will document the use of appropriate warning signs to be placed near construction sites and the training to be provide to drivers; and
- **Healthcare services and disease control**: a community healthcare subplan will be provided to detail formal quarterly (and more frequently, as required) liaison with applicable health authorities to assess Scheme impact on public healthcare services and disease control. The plan will detail onsite medical facilities and first aid room for treating workers onsite, and provisions for treatment of workers residing offsite.

Should the applicable municipal councils implement new bylaws to require additional fees for the KIBP such as parking fees for Scheme vehicles, the Scheme will fully comply with them.

The Community Health and Safety Plan will be aligned with other community documents such as the Stakeholder Engagement Plan and Community Investment Plan and, other labour plans such as the Occupational Health and Safety Plan, Worker Code of Conduct and the Workers Accommodation Plan.

12.4.5.15 Emergency Preparedness and Response Plan

An emergency preparedness and response plan (EPRP) will be developed so that the Scheme and relevant third parties (local authorities and emergency services) are prepared to respond to accidental, abnormal, unanticipated and emergency situations in a manner that prevents and mitigates harm to people and the environment. The EPRP will identify accidents and emergency situations and the communities and individuals that may potentially be impacted, such as pedestrians that use roads directly adjacent to the site boundaries. The EPRP will identify response procedures, provision of equipment and resources, designation of responsibilities, communication systems and channels and periodic response training.

12.4.5.16 Security Management Plan

A Security Management Plan will be developed and implemented by the EPC contractor that is aligned with the UN Voluntary Principles on Security and Human Rights and the IFC's 2017 Good Practice Handbook 'Use of Security Forces: Assessing and Managing Risks and Impacts'. The objective will be to manage and monitor both the use of public and private security and to safeguard the rights of community members. This plan will include but not be limited to:

- Roles and responsibilities, including those of LAI villages' local council committees
- Procedures to undertake due diligence on private security firms prior to awarding contracts, to check for past claims related to human rights contraventions and past abuses of power by the public, media and police
- Hiring requirements for security guards including criminal background checks
- Use of force policies and specialised training of security staff in conflict resolution
- Firms' internal monitoring and community grievance resolution procedures
- Requirements for the types and frequency of training to be provided to guards
- Equipment to be provided to guards and management of equipment
- Security workers' code of conduct

Community members will be encouraged through stakeholder engagement activities to report any human rights contraventions of security personnel through the community grievance mechanism without retribution from public or private security.

The security plan will be developed and implemented in consultation with the LAI villages' local councils, to ensure the plan is conceived not just to protect the Scheme from trespassers or theft but to protect the human rights of communities surrounding the site.

12.4.5.17 Influx Management Plan

An influx management plan (IMP) will be produced to avoid and mitigate the adverse effects of Scheme-induced migration. This will include consideration of the following measures, to be undertaken in consultation and in partnership with district governments (including community development officers and spatial planners) and civil society organisations:

- Ring-fencing community investment funds for spatial planning and to support local initiatives to address greater demand for social and community services and infrastructure.

- Holding influx forums every year during construction to bring together stakeholders and service providers to create awareness of influx status, share any monitoring data available, and identify lessons learned.
- Supporting counselling services in response to known existing problems to raise awareness and target services to the community, for example in relation to marital relationships, gender-based violence, alcohol and drugs.
- Addressing HIV/AIDS prevalence through coordination with the Ugandan Ministry of Health and civil society with activities that are consistent with national policies, treatment guidelines and outreach approaches.

The IMP will need to be closely aligned with the community investment plan (Section 12.4.5.6).

12.4.5.18 Proposed Monitoring

The management plans will include monitoring and auditing. Key issues for livllg in the construction phase will be economic displacement, labour rights and working conditions, and influx management.

The LRP will identify internal and external monitoring procedures and performance indicators for implementation of the LRP. Post LRP evaluations will be required. International lenders often require a close out LRP report.

Labour and working conditions will need ongoing, internal monitoring. Monitoring will include supervision of all subcontractors' management of labour and working conditions. The ESMP will identify the regularity, indicators, and verification methods to address labour rights and working conditions.

The influx management strategies contained within the ESMP will identify information that will be collected throughout the construction period related to the AoI and LAI and WAI communities. Regular reporting of the construction labour force profile (such as age, gender, skill level, main residence, current residence, number and age of accompanying family members) by the main contractor will support the local government authorities' understanding of in-migration rates and magnitude.

12.4.1 Residual Effects

Residual effects are those that remain after mitigation and/or enhancement measures have been implemented. A summary of effects anticipated following application of mitigation and/or enhancement measures is presented in Table 12.16.

Table 12.16: Residual socioeconomic effects after the application of mitigation

Receptor	Summary of impact	Temporary/ Permanent	Adverse/ beneficial	Magnitude of Impact	Sensitivity of Receptor	Effect Evaluation	Significance of Effect
Construction							
Informal land users of KIBP site	Economic displacement	Permanent	Adverse	Moderate	Medium	Moderate adverse	Significant
LAI village households in Kazinga Main, Degeya-Ssenyi, Kireku Railway	Loss of access to provisioning ecosystem services (water sources, grazing land)	Permanent	Adverse	Minor	Low	Minor adverse	Not significant
LAI villages Scheme workers	Temporary employment generation	Temporary	Beneficial	Moderate	Medium	Major beneficial	Significant
Scheme workers	Labour and occupational health and safety risks	Temporary	Adverse	Minor	Medium	Moderate adverse	Significant
Local and regional businesses WAI	Increased revenue for local and regional businesses	Permanent	Beneficial	Moderate	Medium	Major beneficial	Significant
LAI villages	Scheme-induced in-migration	Temporary / Permanent	Adverse	Minor	Medium	Moderate adverse	Significant
LAI villages	Traffic and other community health and safety hazards	Permanent	Adverse	Minor	Medium	Moderate adverse	Significant
LAI villages	Pedestrian severance of access routes	Permanent	Adverse	Minor	Low	Minor adverse	Not significant
LAI villages	Raised expectations for opportunities, resulting in increased community frustrations	Permanent	Adverse	Minor	Low	Minor adverse	Not significant
Operation							
LAI villages KIBP workers	Direct employment generation	Permanent	Beneficial	Minor	Low	Minor beneficial	Not significant
Local and regional businesses WAI	Increased revenue for local and regional businesses and governments	Permanent	Beneficial	Moderate	Medium	Major beneficial	Significant
LAI villages	Improved roads and accessibility	Permanent	Beneficial	Minor	Low	Minor beneficial	Not significant
LAI villages (Kazinga Main, Kireku Railway, Mawotto, Kiwanga Lwanda, Nantabulirwa, Kireku Main, Koolo-Buwanyi)	Traffic impacts on local residents, pedestrians and motorists	Permanent	Beneficial	Minor	Low	Minor adverse	Not significant

13. Traffic and Transport

13.1 Introduction

13.1.1 Overview

This chapter presents the assessment of identified impacts related to traffic and transport to the proposed development, both during construction as well as operation of the proposed infrastructure.

The assessment is focused on impacts on the road transport network, as this is the primary access network for users of the site until other transport links (i.e. rail) are established.

This assessment describes the methodology used to assess transport and access impacts, identifies the Area of Influence, its baseline and the sensitive receptors within it, and presents an assessment of the potential impacts to identify where significant effects are expected to arise.

13.1.2 Study Area and Area of Influence

The study area is determined in line with the approach set out in Section 4.6. Therefore, the study area includes the existing and proposed road network of KIBP, access roads and communities along those roads. The area of influence extends to a high-level catchment area the proposed business park with regard to the main commuting and transport routes of users of the site, including workers, visitors and goods and freight vehicles.

13.2 Methodology

The assessment involved establishing the baseline, described in Section 13.3, as well as an assessment of impacts based on predicted volumes of vehicle movements and types that would be generated during construction and operation of the proposed development. Further, mitigation measures were identified to minimise any adverse effects arising from these impacts. Possible effects arising as a result of the impacts from additional traffic have been identified and their significance assessed. The assessment has been completed using data provided by the client, strategic transport studies as referenced, as well as observations made during the Mott MacDonald site visit in May 2019. The significance criteria adopted for the assessment of impacts and evaluation of effects is set out in Section 13.2.1.

13.2.1 Determining Magnitude, Sensitivity, and Impact Significance

The criteria for determining magnitude and sensitivity are defined in Table 13.1. The magnitude of impacts was determined taking into consideration that the baseline showed that both access roads are already operating at capacity. Criteria for determining receptor sensitivity are defined in Table 13.2.

Table 13.1: Criteria for determining magnitude of Transport-related impacts

Magnitude (adverse or beneficial)	Definition (considers duration of the impact, spatial extent and reversibility
Major	Fundamental change to the specific environmental conditions assessed resulting in long term or permanent change, typically widespread in nature (regional national and international), would require significant intervention to return to baseline; exceed national standards and limits.

Magnitude (adverse or beneficial)	Definition (considers duration of the impact, spatial extent and reversibility
Moderate	This includes any road link where this is >20% traffic flow change. Moderate Detectable change to the specific environmental conditions assessed resulting in no fundamental temporary or permanent change. This includes any road link where there is approximately 11 to 20% traffic flow change.
Minor	Minor Detectable but minor change to the specific environmental conditions assessed. This includes any road link where there is approximately 2 to 10% traffic flow change.
Negligible	No perceptible change to the specific environmental conditions assessed. This include any road link where there is <2% traffic flow change.

Source: Mott MacDonald

Table 13.2: Criteria for determining Transport-related receptor sensitivity

Sensitivity	Definition (considers duration of the impact, spatial extent and reversibility)
High	Vulnerable receptor (human or infrastructure) with little or no capacity to absorb proposed changes or minimal opportunities for mitigation. (e.g. Receptors located at 0-5 meters from the access road and absence of any traffic barrier or road that is oversaturated at least two days per week).
Medium	Vulnerable receptor (human or infrastructure) with limited capacity to absorb proposed changes or limited opportunities for mitigation. (e.g. Receptors located at 6-10 meters from the access road with limited traffic barriers such as low fence or green buffer or road at capacity most days).
Low	Vulnerable receptor (human or infrastructure) with some capacity to absorb proposed changes or moderate opportunities for mitigation (e.g. Receptors located at >11-15 meters and have fences and green buffer or road with occasionally at capacity).
Negligible	Vulnerable receptor (human or infrastructure) with good capacity to absorb proposed changes or and good opportunities for mitigation (e.g. Receptors are located > 15 m and have sufficient fences and green buffer or minor road that is occasionally used).

Receptors within the study area are identified below, considering the environmental aspects presented with regard to the traffic baseline:

- Roads – in particular Kampala-Jinja main highway and Old Kampala – Jinja Road;
- Motorists – including HGV[81], LGV[82] and motorcycle riders using the road network;
- Pedestrians, Cyclists - Other roads users of the road network (users within the site as well as commercial and private users);
- Livestock – Local keepers of livestock use the roads to move their herds of cattle;
- Employees/Users of the Site – up to 20,000 workers are expected to use the site once fully operational half of which are expected to use public transport to commute to site. The other half is assumed to commute to site either on foot or by public/private transport. Also considered are visitors and customers accessing the site during operation;
- Construction Workers – accessing and moving across the site during construction; and

[81] Busses, Trucks

[82] Passenger Cars, Vans and mini busses.

- Residents - in communities along transport routes, particularly those close to the Scheme site as well as 2,000 residents within the site once fully operational.

13.2.2 Limitations

It is assumed that the construction traffic estimates in this chapter consider the construction of the WWTW and Waste Facility for which a separate ESIA will be issued once the design has been progressed further. However, the separate ESIA for these elements will take these effects into consideration and provide a more detailed assessment.

Further, whilst the presented construction traffic estimates allow for some deliveries to site, construction materials and waste volumes will be estimated by the contractor at a later stage. It should be noted that additional construction due to waste transfers may change the result of the impact assessment in terms of construction traffic.

The assessment assumes that the site will be fully operational in 2023. It should be noted that the proposed development is currently only expected to be completed in 2023, after which occupiers of the site will start developing their plots within the KIBP. It is therefore unlikely that the park will be fully operational in 2023. However, no up to date transport studies were available that would consider future infrastructure such as the Kampala-Jinja Expressway which is expected to be operational in 2023. Therefore, no realistic forecast can be made beyond this year. The assessment for the year 2023 presents the worst-case scenario for this year.

Operational traffic estimates for the KIBP accounting for transport of materials, products and other freight going to and from the Freight Village are uncertain. Further, a cargo rail link is proposed as part of the development, however, it is unknown what proportion of the cargo traffic will be diverted to rail transport, once operational nor is there any information as to when the rail line itself will be upgraded to connect to the proposed rail sidings. Given this uncertainty and in the absence of up to date studies on future traffic volumes, it is not possible to fully assess the long-term impact of the additional traffic arising from KIBP once fully operational. A strategic transport assessment, considering proposed infrastructure developments as well as major developments such as KIBP would be required to fully assess the likely long-term impact of the proposed development. The operational Impacts assessed in this chapter assume the operation of the proposed infrastructure elements as detailed in the project description of this ESIA, rather than the fully operational KIBP.

13.3 Baseline

This section provides a description of the current traffic and transport conditions at the existing KIBP, including the existing road network, traffic counts as well as access routes and public transport facilitation.

The study area is determined in line with the approach set out in Section 4.6. Therefore, the study area includes the existing and proposed road network of KIBP, access roads and communities along those roads. The area of influence extends to a high-level catchment area the proposed business park with regard to the main commuting and transport routes of users of the site, including workers, visitors and goods and freight vehicles.

Sources referenced include: Traffic survey Report for KIBP (Q&L, May 2019), Document: Traffic Data requested by Mott, GIBB Final Design Report, Kampala Jinja Expressway PPP Project Pha1 1 ESIA Executive Summary, Earth Systems, Atacama Consultants, August 2018), National Transport Plan, Abridged Version (Uganda Ministry of Works and Transport, 2009) as well as National Transport Strategy (Uganda Ministry of Works and Transport, 2009).

13.3.1 Existing Road Network and Site Access

The KIBP is located approximately 11 km east of Kampala. The site is accessed by road from the Kampala – Jinja main road, as well as the Old Kampala – Jinja road. These roads suffer from congestion, and it is noted that the number of road vehicles predicted to make use of these roads in the future will rise considerably, which will make congestion worse without interventions. The Kampala – Jinja road is the primary highway linking Uganda with countries to the east and west, including the port of Mombasa in Kenya.

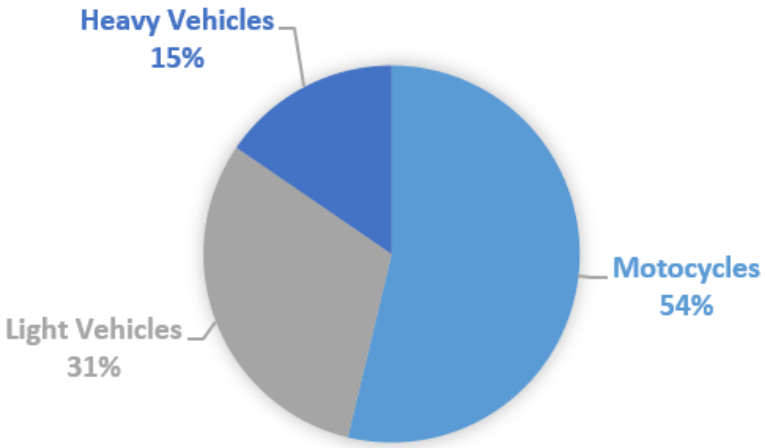
The Kampala Jinja Expressway is currently under construction and scheduled to be operational in 2023.

Currently within the site, the majority of roads are unpaved tracks with poor pedestrian facilities. Some primary roads are tarmacked, but these are limited. There is potential for conflict between vehicles, livestock and people. Street lighting is currently not provided.

13.3.2 Traffic Survey

A traffic survey was carried out for the two main roads providing access to the existing KIBP (Q&L, May 2019), namely Old Kampala Jinja Road and Kampala Jinja Road. The survey shows that during the survey hours, two-way traffic volumes on Old Kampala - Jinja Road were lower compared to the Jinja road, averaging at 645 vehicles per hour. It also noted higher traffic flows towards Namilyango (eastbound) than towards Bwyogere (westbound). The vast majority of vehicles on the Old Kampala – Jinja Road was classified by vehicle type as Motorcycles (54%) whilst 31% were light vehicles and 15% heavy vehicles (see Figure 13.1).

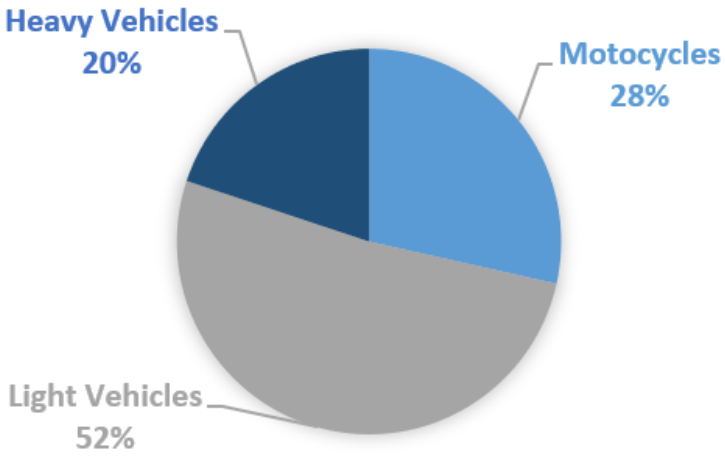
Figure 13.1: Traffic on Old Jinja Road, Classified.



Source: Q&L, 2019

Traffic on the Kampala Jinja Road averaged at 1189 two-way vehicles per hour. Traffic movements towards Kampala (westbound) were higher during rush hours (8-10am) whilst movements towards Jinja (eastbound) increased thereafter. The majority of vehicles on this road were classed as light vehicles (52%), followed by motorcycles (28%) and Heavy vehicles (20%), as illustrated in Figure 13.2.

Figure 13.2: Traffic on Kampala -Jinja Road, Classified.



Source: Q&L, 2019

13.3.3 Public Transport

Public transport is currently limited to buses (heavy vehicles as well as light vehicles, i.e. 12 seaters) running along the Kampala Jinja Road which are operated on a hail-and-stop basis.

13.3.4 Other Transport Infrastructure (Rail, Air)

An existing railway intersects the site but does not currently serve it. This is a single-track route that is used by a few freight trains per day. It is open and accessible, with level crossings used where the railway intersects which do not include warning lights or barriers. New railway sidings connecting to the Namanve Railway line are proposed for freight traffic.

An existing trunk railway used for freight passes adjacent to the south of the KIBP. The Scheme considered for this ESIA Scoping Report proposes connecting to this railway in the future (which will be overseen by the UIA), providing sidings within the KIBP to enable the transporting of goods into and out of the KIBP. However, the scheme does not include modifications to the existing trunk railway itself.

The National Transport Strategy (Uganda Ministry of Works and Transport, 2009) of recognized rail as a suitable mode of transport for long-distance cargo and predicts that rail cargo could increase from 1,900 tonnes in 2015 to 2,836 in 2025. It states that railway concessions will be aimed at achieving this level. However, in terms of rail, the National Transport Master Plan from 2008-2023 only includes direct investment in the Kasese and Pakwach line as well as the Gulu-Sudan line.

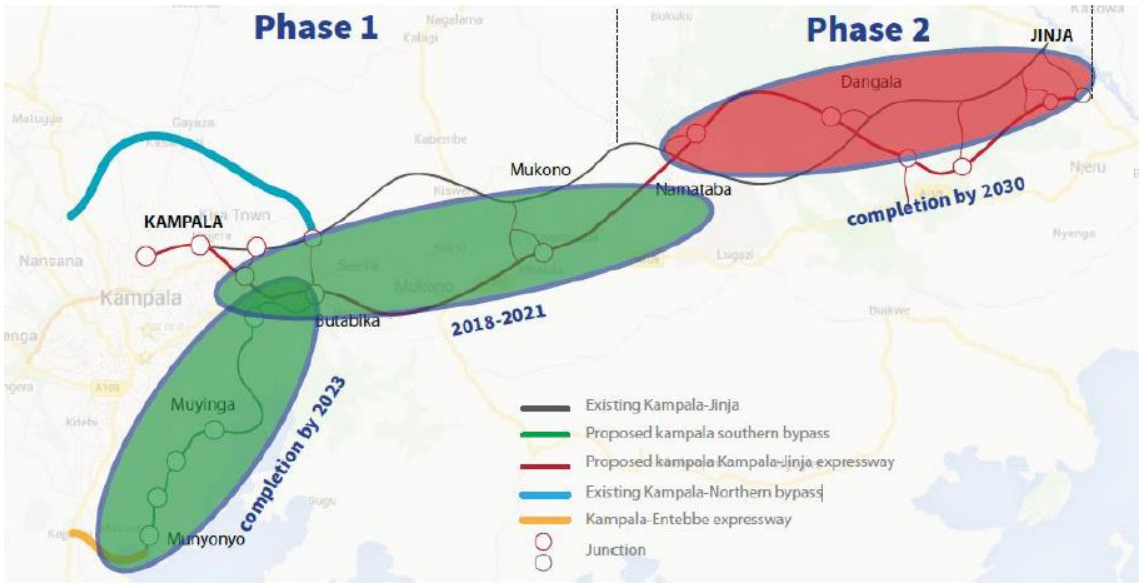
It is also intended that there will be a passenger commuting service between Kampala and KIBP, interchanging with the KIBP's internal bus routes, however, it is unknown when this service will be operational and therefore it is not taken into account as part of this assessment.

Due to the location of KIBP and the nature of the businesses it intends to attract, air transport is not considered further for the purpose of this assessment.

13.3.5 Future Baseline: Traffic Data

A limited access, tolled Expressway is proposed which is expected to improve connectivity in central and eastern Uganda, as discussed further in Chapter 16. The project comprises the Kampala Jinja Expressway Mainline running from Kampala to Jinja and the Kampala Southern Bypass. The first of two construction phases will include a 35km section of the mainline expressway from Kampala to Namagunga which is expected to be operational in 2023. The extend of the proposed Expressway is shown in Figure 13.3.

Figure 13.3: Proposed Kampala Jinja Expressway alignment and phasing.



Source: Earth Systems et al, 2018

No detailed long-term traffic studies are available on either the Jinga Highway or the old Jinga Road. However, forecast traffic volume are available for the Jinga Highway from *the Pre-Feasibility Study for Strengthening and Improvement of Sections of the Northern Corridor Route (Malaba – Kampala – Katuna) EU Framework Contract. July 2007* (see Table 13.3 below) These figures show that in 2020 the total vehicles per day were predicted to be approximately 50,000 (an increase from approximately 22,000 in 2010) and will further increase to approximately 115,000 in 2030. Whilst these numbers show a large increase it is not clear of the basis of the forecast data, as to the assumptions around improvements on the Jinja highway to enable in the road infrastructure to have the capacity for the high vehicle flows and if the KIBP is included in the forecasts.

Table 13.3: Jinja Road Forecast Traffic Volumes (vpd)

From	To	Length (km)	2020	2030
Kampala	Kenya Border			
Kampala	Bweyogerere	6.5	85,898	197,037
Bweyogerere	Mukono	10.8	50,273	115,319
Mukono	Lugazi	24.2	16,483	34,411
Lugazi	Njeru	29.9	7,659	14,581

Source: Table 1.6: Forecast Traffic Volumes (vpd): Pre-Feasibility Study for Strengthening and Improvement of Sections of the Northern Corridor Route (Malaba – Kampala – Katuna) EU Framework Contract. July 2007

It should be noted that the above traffic flow projections do not take into account the impact of the proposed Kampala – Jinja expressway road once its completed. Consequently, the actual projections may be significantly lower than that indicated above once the Kampala – Jinja expressway road has been built.

No traffic projection is currently available for the Old Kampala Jinja Road.

A traffic generation model developed by the Scottish Development Authority (year unknown) was used for an initial prediction of total traffic arising from the completed KIBP (GIBB Final Design Report) This model projects traffic based on the assumption of a fully developed Park and is related to the level of employment generated from the park. The summary of traffic projections offered by GIBB is as shown in Table 13.4.

Table 13.4: Predicted total traffic of completed Sectors A and B.

Trip Type	South A	South B	Total
Estimated goods trips (2 way)	1,200	1,460	2,660
Daily total 2 way trips (all vehicles)	9,800	10,400	20,200
Estimated peak hour trips	1,210	1,240	2,550

Source: GIBB's Final Design Report

The above figures have been revised to include the remaining sectors as well as expected user figures, as detailed below.

KIBP is expected to attract 15-20,000 users per day. More than 10,000 workers will have to commute between the metropolitan area of the capital city and the Park – details of a working public transport system area unknown. A two-tier bus system is proposed, with a main bus shuttle running from central Kampala to KIBP and two mini bus lines to provide access around the park.

It is assumed that 10,000 operational workers will be travelling to site using public transport in the form or minibuses (12-seater minibuses) which would lead to approximately 834 one way (1670) two-way journeys per day[83].

For HGVs 22 waiting bays outside the freight village have been proposed. Trucks waiting for new orders for a longer period can park either in the North Sector, for 46 units. The other in South A Sector, for 1,212 units and the third, in South C Sector, for 220 units. A heavy truck toll-yard for 121 units, with access through the South roundabout is proposed to allow HGVs to park off-road.

For the purpose of this report it is assumed that during operation there will be 9,000 two-way HGV journeys to KIBP per day, accessing either via the Old Kampala Jinja Road or the Kampala Jinja-main road[84].

Based on the survey data in Section 13.3.2 and the assumptions made in Section 13.3.5, annual average daily traffic flows have been modelled for both, the Jinja Highway and Old Jinja Road. Further, the following assumptions have been made.

- 70/30 split between Jinja and Old Jinja Road
- 2023 flows assumed to be 20,000 for Jinja Road
- 50/50 split for direction of travel for HGVs

[83] Assumptions as agreed with client per e-mail to CM on 24th May 2019.
[84] Assumptions as agreed with client per e-mail to CM on 24th May 2019.

The results are shown in Table 13.5.

Table 13.5: Annual Average Daily Traffic (AADT) 2019 and classification.

	AADT	%HGV	%LGV	% Motorcycle	Speed Kph
Jinja Highway	17783	19.9	51.6	28.5	40
Old Jinja Road	9400	15.5	30.8	53.7	30

Source: MM based on data provided by Lagan-Dott and Q&L.

13.4 Assessment of Effects

The Scheme has the potential to result in impacts upon traffic and access, with resulting effects on sensitive receptors. These are described below for both the construction and operational phases.

13.4.1 Construction Impacts and Effects

13.4.1.1 Activities generating traffic

Table 13.6 illustrates the predicted construction traffic including traffic generating activities during construction.

Table 13.6: Predicted Construction Traffic

1	Construction Traffic Type	No	Trips per hour	Per 8 hr day
	Tipper Trucks	20	2.7	432
	Bulldozer	2	2.7	43.2
	Motor Grader	4	2.7	86.4
	Vibrating Roller	4	2.7	86.4
	Brum Vibrating Roller	3	2.7	64.8
	Wheel loader	4	2.7	86.4
	Water Tanks	6	1	48
	Pressuve Bitumen Distibuter	2	1	16
	Pneumative Roller	2	2.7	43.2
	Mechanical Boom	2	4	64
	PUulvimxer	1	4	32
	Fuel Tank	1	0.25	2
	Low Bed	2	0.5	8
	Sub total			**1012.4**
2	**Deliveries trucks/vans**	n/a	10	80
3	**Construction Supervision (4x4)**	40	4	160
4	**Workers Transport***	150	0.25	300
	Total Daily Traffic at Peak			**1283**

Source: Lagan-Dott. *) Workers transport assumes 1/4 of total no (600)

During construction, the above figures assume 285 HGVs and 230 LGVs.

Based on the above and the modelled AADT 2019 shown in Table 13.5 in Section 13.3, the estimated annual average daily traffic including construction traffic is shown in Table 13.7 below.

Table 13.7: Annual Average Daily Traffic 2019 including Construction traffic

Road	AADT	%HGV	%LGV	% Motorcycle	Speed Kph
Kampala Jinja Main Road	18,144	20.6	51.5	27.9	40
Old Kampala Jinja Road	9,555	16.1	31.0	52.8	30

Source: MM based on data provided by Langan-Dott

It should be noted that above number presents the worst-case scenario, which will apply in the in Quarter/phase (Qtr) 5 of the construction programme, which is expected to last 675 days. For the remaining construction period, traffic is expected to be decreased as follows:

- Qtr 1 & 2 – Design period, 10% of total construction traffic
- Qtr 3 - 30%
- Qtr 4 - 60%
- Second last Qtr 50%
- Last Qtr 20%

Compared to the observed AADT, traffic on the Kampala-Jinja Main road and the Old Kampala - Jinja Road by 2 and 1.6%, respectively. This additional traffic generates an increase of less than 1% of HGVs and a maximum of 0.2% in LGVs on both roads. In actual figures, this means there would be an additional AADT of 200 HGVs and 161 LGVs on the Kampala-Jinja Main Road and an additional 86 HGVs and 69 LGVs on the Old Kampala Jinja Road. This increase in traffic may lead to a number of impacts affecting sensitive receptors in the study area. These are described in the following sections. These include:

- Reduced capacity of existing road network: Additional volume of traffic on the road network resulting in disruption to existing users, increased risk of accidents involving equipment delivery trucks, as well as reduced connectivity due to increased congestion;
- Wear and tear: Wear and tear as a result of type of traffic and volumes;
- Reduced road safety to local residents: Reduced safety of residents of surrounding villages, particularly vulnerable groups such as pedestrians; and
- Reduced road safety to construction workers: Reduced safety of construction workers within the site.

Each of the above impacts and resulting effects is discussed in the following sections.

In addition, local residents along the access roads and construction workers will experience increased noise and air pollution in addition to being exposed to the increased safety risk described above. Noise and air pollution effects as a result of construction traffic are considered in the respective aspect chapters.

13.4.1.2 Reduced capacity of existing road network

Although the construction traffic will only lead to a maximum 2 % increase in traffic on both access roads, the capacity of the road network is already saturated and therefore, this increase is likely to lead to increased delays and higher risk of accidents. Construction is expected to last nearly three years (34 months) and albeit the maximum increase is only expected during around two years of this time, local residents and road users would be exposed to minor additional delays for the majority of the construction period. However, additional traffic may arise once the construction waste volumes are confirmed, which may change the magnitude of this impact.

The sensitivity of receptors along those roads is considered high, as these roads are already saturated and therefore have no capacity to absorb change.

Application of the significance criteria concludes the impact of construction movements associated with the proposed development on the capacity of the local road network is of **minor adverse effect** which is **not significant.**

13.4.1.3 Wear and Tear

The use of HGVs and other vehicles on the road network has a potential to contribute to deterioration of the roads.

With respect to the physical effects of construction traffic, it is considered that the additional traffic will cause minor additional wear and tear effects on the local road infrastructure due to the relatively small increase in vehicle movements that are expected to occur in relation to existing traffic. Although the condition of the road lacks maintenance, the sensitivity of the local road network to additional truck movements is considered medium as the roads are already being used for these vehicle types.

The overall the effect of construction traffic on local road 'wear and tear' is therefore assessed to be **minor adverse** and therefore **not significant**.

13.4.1.4 Reduced Road Safety on access roads

The Kampala Jinja Highway and the Old Kampala Jinja road run through villages where these roads are frequented by pedestrians and occasionally livestock. Locals cross the roads and sell goods to motorists during peak hours. The additional traffic presents an increased safety risk to those pedestrians. A formal road traffic assessment has not been undertaken due to lack of reliable data. However, the existing traffic is already at capacity, therefore, it is considered that the additional traffic presents a moderate increased risk of collision.

The sensitivity of the receptors is medium as the receptors are already used to high traffic volumes including HGVs and therefore are likely to adapt to this change although there are limited opportunities for mitigation.

The overall effect on construction traffic on road safety is assessed to be **moderate adverse** which is **significant**.

13.4.1.5 Reduced Safety to construction workers

Within the site, workers are exposed to increased safety risks due to frequent construction vehicles moving around the site. During the peak construction period (Quarter 5), workers are at moderate risk of being hit or run over by moving construction vehicles.

The sensitivity of the receptors is low as there are moderate opportunities for mitigation.

However, without mitigation, the receptors would have little capacity to avoid this risk, and therefore, their sensitivity would be medium, and the effect would be **moderate adverse** which is **significant**.

13.4.2 Operational Impacts and Effects

13.4.2.1 Operational activities generating traffic

Based on the survey data in Sections 13.3.2 and the assumptions made in Section 13.3.5, traffic flows have been modelled for an interim assessment year of 2023, as this year when the

proposed Jinja Expressway is expected to be operational, following which traffic flows are expected to change again. The results are shown in Table 13.8 and Table 13.9 respectively.

Table 13.8: Operational Traffic Prediction without KIBP 2023

2023 without KIBP								
	Daily flow	**%HGV**	**%LGV**	**% Motor -cycle**	**daily flow HGV**	**daily LGV flow**	**daily motorcycle flow**	**Speed kph**
Jinja Highway	20,000	19.9	51.6	28.5	3,980	10,320	5,700	40
Old Jinja Road	10,572	15.5	30.8	53.7	1,639	3,256	5,677	30

Source: MM based on data provided by Lagan-Dott

Table 13.9: Operational Traffic Prediction with KIBP 2023

2023 with KIBP								
	Daily flow	**% HGV**	**%LGV**	**% Motorcycl e**	**daily flow HGV**	**daily LGV flow**	**daily motorcycle flow**	**Speed kph**
Jinja Highway	24,319	29.3	47.2	23.4	7,130	11,489	5,700	40
Old Jinja Road	12,423	24.1	30.2	45.7	2,989	3,757	5,677	30

Source: MM based on data provided by Lagan-Dott

The above figures, compared to the Annual Average Daily Traffic 2019 data presented in Table 13.5 in Section 13.3, show that without the KIBP there would be an overall traffic increase of 12%, both on the Kampala-Jinja Highway as well as the Old Kampala-Jinja Road. With the additional traffic from a fully operational KIBP, in 2023 there would be an increase of 6,536 (37%) vehicles on the Kampala-Jinja Highway and an increase of 3,023 (32%) vehicles on the Old Kampala-Jinja Road.

Transport is expected to increase significantly as a result of the proposed development in the long-term. The increase in traffic could be up to 25% on the Kampala-Jinja Highway and 20% on the Old Kampala-Jinja Road. Phased occupation of the industrial park upon completion could help to relieve this pressure. This can be assessed once further strategic transport studies are available, including data of the traffic relief that is expected to result from the proposed Kampala-Jinja Expressway once operational.

This increase in traffic may lead to a number of impacts affecting sensitive receptors in the study area. These include:

- Reduced capacity of existing road network: Additional volume of traffic on the road network resulting in disruption to existing users, increased risk of accidents involving equipment delivery trucks, as well as reduced connectivity due to increased congestion;
- Wear and tear: Wear and tear as a result of type of traffic and volumes;
- Reduced road safety to local residents: Reduced safety of residents of surrounding villages, particularly vulnerable groups such as pedestrians;
- Public Transport Provision: for user of the operational site; and
- Parking Provision: Parking opportunities for visitors, residents and occupiers of the commercial and industrial units within the operational site.

Each impact is discussed in the following sections for the operation of the proposed development.

In addition, local residents along the access roads will experience increased noise and air pollution in addition to being exposed to the increased safety risk described above. Noise and air pollution effects as a result of construction traffic are considered in the respective aspect chapters.

13.4.2.2 Reduced capacity of existing road network

The Kampala-Jinja Main road and Old Kampala-Jinja Road are already regularly saturated due to not only the intense traffic flow with a high percentage of heavy vehicles, but also due to the restrictions imposed by its physical features, e.g. urban crossings.

Without mitigation, the roads do not provide the capacity to efficiently and safely absorb the additional traffic flow that will be generated by the KIBP. The roads are at major risk of increased congestion, particularly during rainfall as mud builds up on roads.

The sensitivity of receptors along those roads is considered high, as these roads are already saturated and therefore have no capacity to absorb change.

The application of the significance criteria concludes the impact of construction movements associated with the proposed development on the capacity of the local road network will have a **major adverse effect,** which is **significant.**

13.4.2.3 Wear and Tear

The use of HGVs and other vehicles on the road network has a potential to contribute to deterioration of the roads.

HGV movements are expected to increase by at least 10% on the Kampala-Jinja Highway and 9% on the Old Kampala-Jinja Road.

With respect to the physical effects of operational traffic, it is considered that the additional traffic will cause moderate additional wear and tear on the local road infrastructure due to the increase in vehicle movements that are expected to occur in relation to existing traffic. Although the condition of the road lacks maintenance, the sensitivity of the local road network to additional truck movements is considered medium as the roads are already being used for these vehicle types.

The overall the effect of construction traffic on local road ‘wear and tear’ is therefore assessed to be **moderate adverse** which is **significant**.

13.4.2.4 Reduced Road Safety to pedestrians within the site

The new roads will provide additional space for pedestrians and cyclists to roam and traffic to circulate which also implies a new, moderate risk to safety of those pedestrians. In addition, primary roads within the site will be tarmac and therefore enable increased speeds within the site, which will lead to an increased risk of road collisions.

The sensitivity of the receptors is medium as the users will be unfamiliar with the site and therefore have little capacity to absorb the proposed changes, although there are moderate opportunities for mitigation.

The overall effect on construction traffic on road safety is assessed to be **moderate adverse** which is **significant**.

13.4.2.5 Reduced Road Safety on access roads

The Kampala Jinja Highway and the Old Kampala Jinja road run through villages where these roads are frequented by pedestrians, cyclists and occasionally lifestock. Locals cross the roads and sell goods to motorists during peak hours. The additional traffic presents an increased safety risk to those pedestrians. A formal road accident assessment as not been undertaken due to lack of reliable data. However, the existing traffic is already at capacity, therefore, it is considered that the additional traffic presents a moderate increased risk of collision, as the traffic is expected to move slower with the additional vehicles.

The sensitivity of the receptors is medium as the receptors are already used to high traffic volumes including HGVs and therefore are likely to adapt to this change although there are limited opportunities for mitigation.

The overall effect on construction traffic on road safety is assessed to be **moderate adverse** which is **significant**.

13.4.2.6 Public Transport Provision

It is envisaged that commuters relying on public transport will access the site via minibus services. Off site, this service is understood to be run by private or semi-private providers. Within the park, a privately run mini-bus service will link commuters to their final destination. The exact frequency of the shuttle is demand-based and yet to be confirmed. Depending on the time of the day commuters could be queuing or waiting for shuttles. Off-site the frequency of public transport services is expected to increase due to the higher number of passengers. However, the increased number of overall traffic will increase the commuting times. Overall, the impact magnitude of public transport provision is therefore expected to be negligible.

Rail passenger services are proposed in the future but do not yet form part of the development. In the absence of alternative public transport services, the sensitive of the receptors is high.

The overall effect on public transport provision is assessed to be **negligible,** and therefore **not significant**.

13.4.2.7 Parking Provision

For HGVs, 22 waiting bays and over 1,112 parking bays have been proposed within KIBP. This allows parking for over 25% of the expected 4,500 daily HGVs at any one time. The amount of parking required depends on the expected waiting times of the HGVs, which in the absence of defined occupants is difficult to determine. However, given the overall size of the proposed logistics park, the proposed design could lead to bottle necks and moderate delays[85]. Parking provision for LGVs has not yet been designed; it may be run privately. Without a parking design and plan, there is a moderate risk that insufficient parking space will be available, parking could be unsafe or overpriced. The sensitivity of receptors is high, as there is no safe, alternative parking available off-site.

The overall effect on public transport provision is assessed to be **Major adverse** which is **significant**.

[85] For instance, UK planning parking standards state that for Light and General Industrial premises (Class B2 and B3) the following provision should be made: “A minimum of 1 space or 1 space per 750 m2 GFA for commercial vehicles,whichever is the greater.” https://www.planningni.gov.uk/index/policy/planning_statements_and_supplementary_planning_guidance/spg_other/parking/parking_standards_development/parking_standards_classb.htm#classb2b3 (accessed 14/06/2019). For Kampala this would mean11,870 spaces.

13.4.3 Summary of pre-mitigation construction and operation impacts and effects

A summary of the pre-mitigation potential transport impacts and effects are shown in Table 13.10. Those that are moderate, or major are considered significant. This table does not include secondary impacts covered in other sections.

Table 13.10: Summary of potential impacts and effects, pre-mitigation

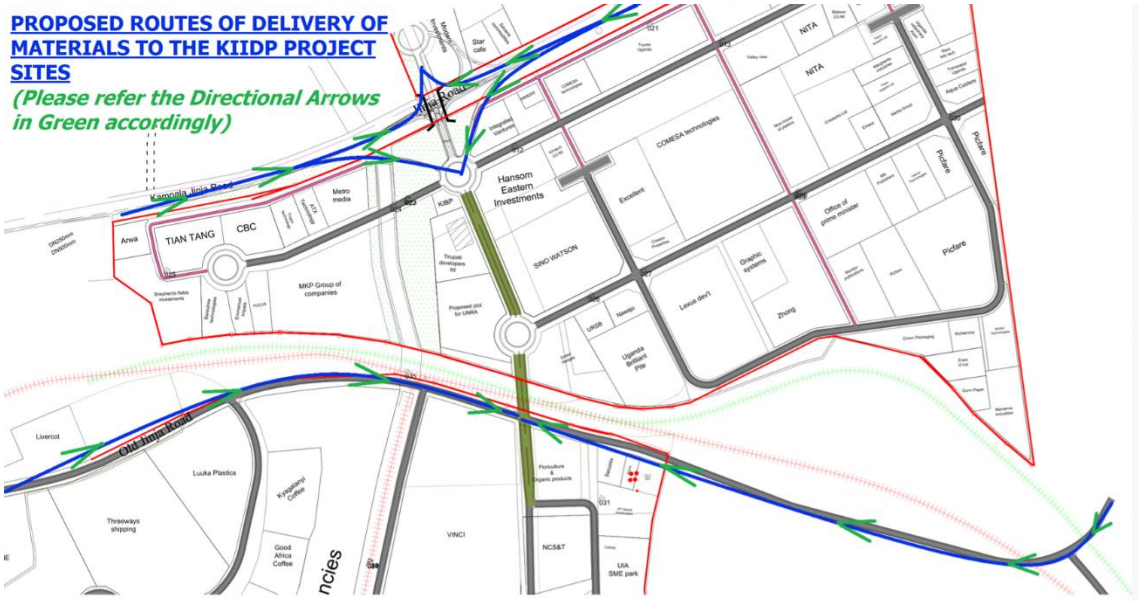
Activity	Receptor	Summary of Impact	Adverse/ Beneficial	Temporary/ Permanent	Magnitude of Impact	Sensitivity of Receptor	Effect of Evaluation	Significance of Effect
Construction phase								
Construction Traffic approaching site via both access roads	Motorists	Reduced capacity of Kampala Jinja and Old Kampala Jinja Road.	Adverse	Temporary	Moderate	High	Minor	Not Significant
Construction Traffic on access roads	Roads	Wear and Tear	Adverse	Temporary	Minor	Medium	Minor	Not significant
Construction Traffic on site and access roads	Residents, Pedestrians, Livestock	Reduced Road Safety on access roads	Adverse	Temporary	Moderate	Medium	Moderate	Not Significant
Construction Traffic	Construction Workers	Reduced Safety to construction workers	Adverse	Temporary	Moderate	Low	Minor	Not Significant
Operational phase								
All Operational traffic	Motorists	Reduced capacity of Kampala Jinja and Old Kampala Jinja Road.	Adverse	Permanent	Major	High	Major	Significant
All operational traffic, particularly HGVs	Access Roads and roads within site	Wear and Tear	Adverse	Permanent	Moderate	Medium	Moderate	Not Significant
All operational traffic, within site and along access roads	Pedestrians, Cyclists	Reduced Road Safety within site	Adverse	Permanent	Moderate	Medium	Moderate	Significant
All operational traffic, within site and along access roads	Pedestrians, Cyclists, livestock	Reduced Road Safety on access roads	Adverse	Permanent	Moderate	Medium	Moderate	Significant
Additional Public Transport to accommodate commuting users of the site	Employees, Users of the Site	Public Transport Provision	Beneficial	Permanent	Minor	High	Moderate	Significant
Parking Provision for HGVs and LGVs	Visitors and Users of the site	Congestion, Delays	Adverse	Permanent	Moderate	High	Major	Significant

13.4.4 Mitigation Measures

13.4.4.1 Construction Mitigation

A Traffic Management Plan (TMP) will be prepared detailing measures to reduce effects on road residents and users of the access roads. These include vehicle routings and for construction vehicles and traffic diversions. For instance, proposed delivery routes are illustrated in Figure 13.4.

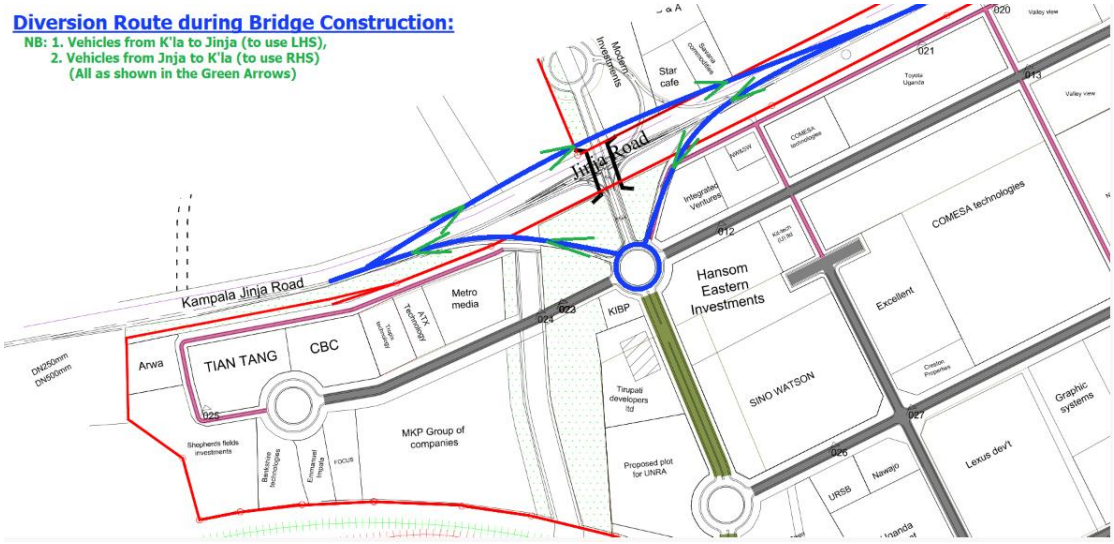
Figure 13.4: Proposed Delivery Vehicle Routing During Construction.



Source: Laggan-Dott, 2019

During the construction of the proposed bridge of the Kampala-Jinja Main Road, the traffic on the main road will need to be diverted. A proposed option is shown in Figure 13.5.

Figure 13.5: Proposed Diversion Route during Fly-over Construction.



Source: Lagan Dott, 2019

It will avoid construction deliveries on local event days and where possible, avoid deliveries during peak hours. Furthermore, the plan will include measures to reduce congestion caused by heavy load times. The plan will document the use of appropriate warning signs to be placed near construction sites and the training to be provide to drivers, as well as vehicle routings during different stages of the construction phasing.

13.4.4.2 Operational Mitigation

Junction Improvements on Kampala Jinja-Road:

The main access to the KIBP is situated in the Bweyogerere-Mukono segment of the Kampala-Jinja road. In order to avoid serious disruption of the Jinja road functionality as a result of the combination of the new traffic flow generated by the KIBP and the expected increase of the Jinja road traffic volume, a grade separated junction along the Kampala-Jinja Road is proposed as part of the Scheme.

Two main junctions/access roads are proposed from the Kampala-Jinja trunk road. This will provide direct access to KIBP Sector South A through which all other sectors can be reached. It will also provide direct access to the Freight Village, which is located in Sector South B. Traffic management will also be implemented, such as restricting right and left turns to reduce conflicting vehicle movements.

Road Improvements on Old Kampala-Jinja Road:

The Old Kampala - Jinja Road will be extended westwards to the Old Port Bell Road through the existing road that traverses the Mbuya, Kinawataka and Kirinya urban areas. Therefore, improvements to this road will be undertaken including widening (to 30m reserve width and 9m roadway width) and upgrades to at least bitumen class II standards.

This road will provide connections to the sectors to the south, with an intersection providing access to the Freight Village; a central junction along the axes of the main KIBP dual-carriageway (which leads from the Kampala – Jinja Main Road); and an eastern junction to provide access to the Sector South C area.

Three-tier Road System Design:

It is considered that the proposed three tier road system will slightly improve the conditions of the existing KIBP and create a workable solution for the future KIBP. The primary road as a minimum will be paved and the central strip and segregation between pedestrians and vehicles as well as drainage systems will improve user safety and reduce delays due to extreme weather conditions within KIBP. Secondary, single carriage way distributor roads would benefit from pavement as well, although this is to be confirmed depending on ground conditions and future use. Perimeter roads will serve for patrolling units and will be designed to suit their limited use.

Rail Sidings:

Rail sidings are proposed as part of the Masterplan for KIBP, to be implemented at a later date as part of the proposed Standard Gauge Railway (see Chapter 16). It is unknown how much cargo will be transferred to rail; however, it is expected that this transport option will provide a minor relief to the current road capacity. A link for passenger rail services is also envisages, although no design is currently available.

Transport Plan:

A Transport Plan could be considered and implemented for the site once in operation, detailing the operation and frequency of the shuttle, safety measures such as speed limits, operating hours to reduce noise and air pollution to residents within the site. The Transport Plan, if

regularly reviewed to consider changes in the transport situation, could benefit future users of the site (e.g. passenger rail services, once operational).

13.4.4.3 Summary of Transport Mitigation Measures

The above detailed mitigation measures are summarized in Table 13.11 below.

Table 13.11: Transport Mitigation Measures.

Type of measure	Detail
Embedded mitigation – mitigation which is built in to Scheme during the design and procurement process	- Public Transport Provision - Junction Improvements on Kampala-Jinja Main Road - Road Improvements on Old Kampala Jinja Main Road - Three tier Road System Design - Rail Sidings
Mitigation of significant effects	- Construction Traffic Management Plan - Detailed Parking Design
Mitigation of non-significant effects	- Operational Transport Plan including details of shuttle service frequency to ensure efficient public transport service for users within site.
Enhancement measures	None

13.4.5 Residual Impacts and Effects

Residual effects are those that remain after mitigation and/or enhancement measures have been implemented. A summary of effects after application of mitigation and/or enhancement measures is presented in Table 13.12.

Table 13.12: Significance of Residual Transport Impacts, Post-Mitigation

Activity	Receptor	Summary of Impact	Adverse/ Beneficial	Temporary/ Permanent	Magnitude of Impact	Sensitivity of Receptor	Effect of Evaluation	Significance of Effect
Construction phase								
Construction Traffic approaching site via both access roads	Motorists	Reduced capacity of Kampala Jinja and Old Kampala Jinja Road.	Adverse	Temporary	Minor	High	Minor	Not Significant
Construction Traffic on access roads	Roads	Wear and Tear	Adverse	Temporary	Minor	Medium	Minor	Not significant
Construction Traffic on site and access roads	Residents, Pedestrians, Livestock	Reduced Road Safety on access roads	Adverse	Temporary	Minor	Medium	Minor	Not Significant
Construction Traffic	Construction Workers	Reduced Safety to construction workers	Adverse	Temporary	Moderate	Low	Minor	Not Significant
Operational phase								
All Operational traffic	Motorists	Reduced capacity of Kampala Jinja and Old Kampala Jinja Road.	Adverse	Permanent	Moderate	High	Major	Significant
All operational traffic, particularly HGVs	Access Roads and roads within site	Wear and Tear	Adverse	Permanent	Minor	Medium	Minor	Not Significant
All operational traffic, within site and along access roads	Pedestrians, Cyclists	Reduced Road Safety within site	Adverse	Permanent	Minor	Medium	Minor	Not Significant
All operational traffic, within site and along access roads	Pedestrians, Cyclists, livestock	Reduced Road Safety on access roads	Adverse	Permanent	Moderate	Medium	Moderate	Significant
Additional Public Transport to accommodate commuting users of the site	Employees, Users of the Site	Public Transport Provision	Beneficial	Permanent	Minor	High	Moderate	Significant
Parking for HGVs and LGVs within site	Visitors and Users of the site	Parking Provision	Adverse	Permanent	Moderate	High	Major	Significant

14. Waste and Materials Management

14.1 Introduction

14.1.1 Overview

This assessment describes the methodology used to assess waste and materials, identifies the Area of Influence, its baseline and the sensitive receptors within it, and presents an assessment of the potential impacts to identify where significant effects are expected to arise.

14.1.2 Study Area and Area of Influence

The study area for the purpose of this assessment includes the area of the existing and proposed KIBP. The area of influence further covers landfills and mineral quarries up to 62km away from the site.

14.2 Methodology

The assessment is based on the baseline data described in Section 14.3. The impact identification and assessment of significance was undertaken with regard to the methodology set out in Section 14.2.1. Receptors within the study area were identified considering the environmental aspects with regards to the materials and waste baseline.

The following materials and waste sensitive receptors within the receiving environment are identified within the site boundary and surrounding area, and are considered as part of this assessment:

- Soil within and around the site;
- Groundwater within and around the site;
- Surface water bodies, in particular the Namanve River, the Kayobe Swamp and Lake Victoria to the south;
- Air, i.e. air quality within the KIBP and surrounding area;
- Biodiversity - terrestrial and aquatic ecology, particularly in the adjacent Namanve Central Forest Reserve comprising forest and swamp; and
- Human receptors – residents surrounding the KIBP, users of the KIBP (i.e. visitors and staff), including Visual Amenity to Human receptors.

These receptors have been assessed in relation to the Materials and Waste Impacts identified in this chapter only, any further impacts and receptor specific mitigation measures are detailed in the respective aspect chapters.

14.2.1 Determining Magnitude, Sensitivity, and Impact Significance

Please see the following sections of the main ESIA report:

- Section 4.8.1 - Magnitude Criteria4.8.1
- Section 4.8.2 - Sensitivity Criteria
- Section 4.8.3 - Evaluation of Effects

14.3 Baseline Conditions

14.3.1 Data Collection

This section provides an overview of the existing Sources of Construction Materials in the region as well as the existing Waste Management infrastructure at KIBP. The expected construction and operational waste types resulting from the proposed Scheme are described further below.

The information below is based on previous studies as referenced, as well as information provided by PEC (contracted Engineering Consultants), UIA (the Sponsor) and a site visit undertaken by Mott MacDonald staff in May 2019.

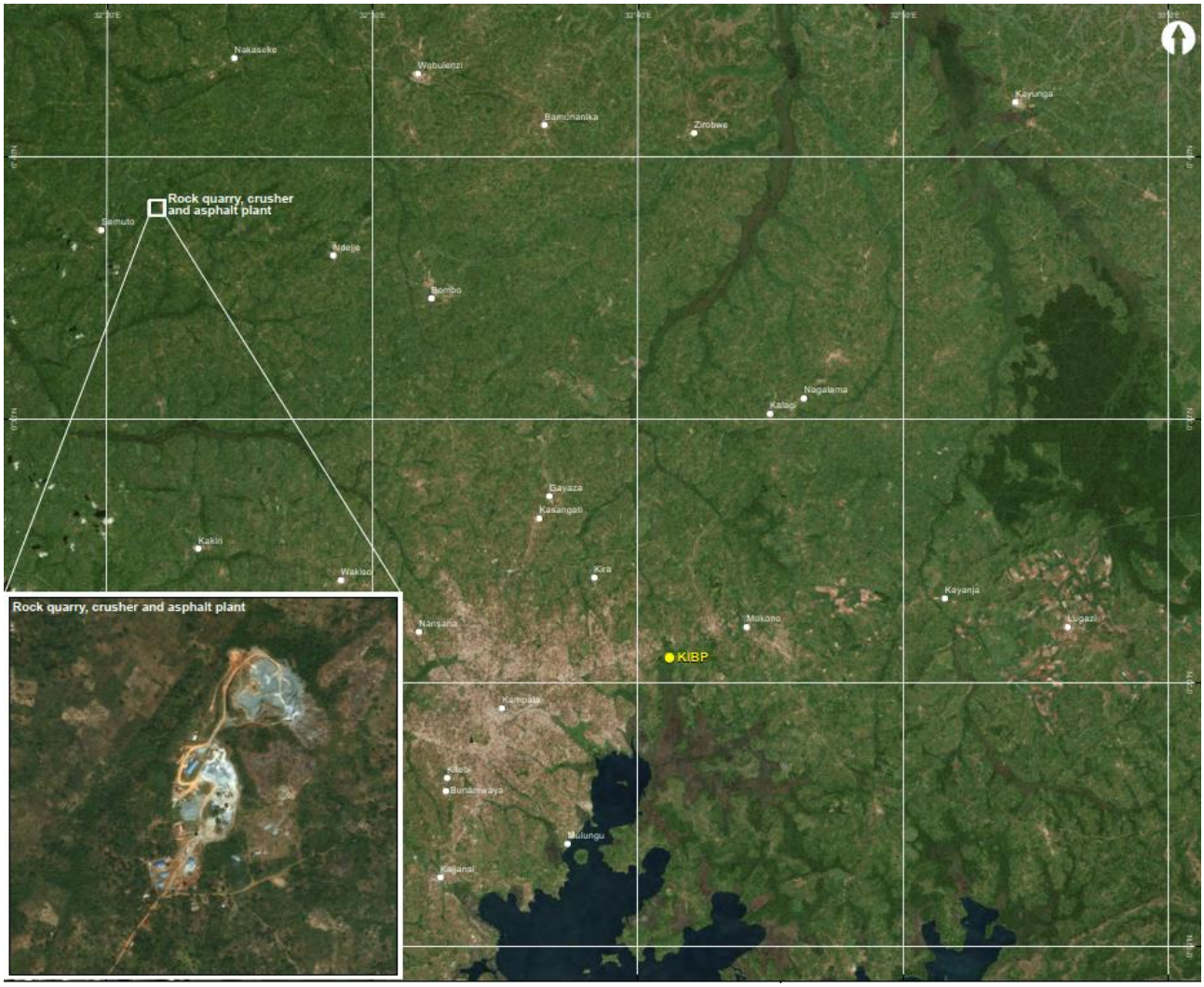
Further, a paper published in the Open Access Library Journal (Omara, T. et all 2019) provides estimated waste arisings at the site.

14.3.2 Sourcing of Construction Materials

The KIBP Feasibility Report (UIA, 2018) discusses sourcing options of granular materials (Gravel, aggregates), sands and hard stone/ rock. Options to source granular materials from borrow pits within or within close vicinity to the site will be prioritised, subject to the materials meeting the required quality. However, the assessment is based on a study dating back to the year 2000 and it is acknowledged that due to the quality of the materials, the majority of granular minerals will need to be imported. The site is currently used for informal, unauthorised sand mining and bricklaying activities. Sand for the proposed development would be sourced from within the boundaries of the KIBP and a hard-stone quarry along the Kampala - Jinja road is mentioned for sourcing further construction materials without detailing its location.

The appointed contractor Lagan Dott JV has provided a Construction Method Statement (Roads) (Form c 4.1.10) (see Appendix 2.9) which includes high-level information on sourcing raw construction materials and equipment. The document states that gravel will be sourced as requested by the lead engineer and other mineral materials will be sourced from the contractors own quarries or locally where feasible. As stated in Section 2.5.6, the contractor's mineral quarries are located in the Semuto – Kapeeka area. The contractor's gravel/rock quarry and crushing facility is located 6km east of Semuto, a settlement located 62 km north-west of the KIBP (see Figure 14.1).

Figure 14.1: Location of Contractor's Minerals Quarry



Source: Mott MacDonald, 2019

The method statement does not currently include information with regards to sourcing of steel/metal materials.

Specific materials, e.g. pipes, bitumen, primer, lime etc will be sourced locally as available, however, some consumables (e.g. street furnishings) will need to be sourced internationally.

According to the programmes and the contractor's Design Proposal Report (see Appendix 14.1) other main construction materials include concrete, asphalt, bricks.

14.3.3 Existing Waste Management Infrastructure

The Socio-Economic survey data in Chapter 12 includes information on the existing waste management infrastructure in the area. This survey contains data collected for the ESIA, 2008. According to the ESIA undertaken in 2008 (KIBP, 2008), the disposal of household solid waste in the surrounding communities is not controlled by Kampala Capital City Council (KCCA) and waste materials are disposed of in gardens or surrounding vegetated areas, or household waste is incinerated informally.

UIA confirmed that waste incineration on site is illegal and that waste-generating occupiers of the KIBP use NEMA licensed waste contractors to dispose of waste produced within the site. In recent ESIAs for the development of individual plots within the operational KIBP, tenants commit to using NEMA authorized waste contractors to dispose of their waste, however, suitable waste sites are not identified (i.e. Fielong Plastics, 2018 and Bajaber, 2017). Further, Mukono's and KCCA's landfills do not accept industrial hazardous waste, which is currently transferred to a hazardous waste facility operated by Luweero Industries, 64km north of Kampala.

The previous ESIA for the site (ESIA, 2008) included a search for waste disposal sites in the area and identifies waste-handling measures to be implemented in order to manage solid, toxic and hazardous waste as well as to reduce soil contamination. The study indicates that the nearest official landfill site is located at Mperwe approximately 13km west of the site.

A more recent waste study carried out in 2019 (Omara, T. et al., 2019) identifies the following waste streams and transfer destinations:

- Recyclable scrap metal is sold to recyclers, inside or outside the KIBP;
- Recyclable plastics are sold to recyclers inside (e.g. Luuka Plastics) or those outside the KIBP; and
- Domestic waste is accepted for landfilling and composting at Katikolo Landfill & Composting site in Katikolo Village in Mukono.

Katikolo Landfill and composting site is the nearer to the site (approximately 12km south) than Kampala City Landfill which is over 15 km away.

The KIPB does not currently provide a waste management facility for its existing occupants. New occupiers currently propose to contract a licensed waste collector to remove and dispose of their solid waste (e.g. Kiteezi) (e.g. Feilong Investments Ltd ESIA, 2018). The previous ESIA for the KIBP masterplan (ESIA, 2008) identifies areas of the KIBP as being used as unauthorised dumpsites for waste generated outside the KIBP, although only limited fly-tipping was observed during a recent site visit. Fly-tipping observed in May was limited to household waste (see Figure 14.2) and bricklaying waste; no evidence of illegally dumped industrial waste was noted.

Figure 14.2: Evidence of fly-tipping on site

Source: Mott MacDonald, 2019

Waste is also generated from the informal, unauthorised sand mining and bricklaying activities currently being undertaken on site. Waste arising from these activities includes but is not limited to rubble, plastic sheeting and organic waste.

14.4 Assessment of Effects

14.4.1 Construction Impacts and Effects

14.4.1.1 Material Use

This section describes the potential impacts arising as a result of materials use for the Scheme.

The main construction materials will include, but are not limited to, sand, gravel, aggregates, rock, concrete and asphalt as well as specific materials such as pipes, bitumen, primer lime, street furnishings etc. Furthermore, it is anticipated that hazardous materials such as fuels and lubricants used for the operation of machinery will be deployed on site.

According to the contractor's Design Proposal Report (see Appendix 14.1) a bill of quantities will be prepared based on typical cross sections, detail drawings and schedules. The estimate will be undertaken as part of the "Engineering Design of Critical Infrastructure", after the final design is issued (10 days after commencement of consultancy services) and will be included in the Engineering Design Report.

Impacts on Biodiversity may occur as a result of habitat loss from the excavation of construction materials within the site which can cause habitat degradation and loss. Measures to manage material sourcing impacts from a from a waste and materials perspective are identified in this Section. However, potential habitat loss and associated mitigation within the site area is assessed in Chapter 6.

Environmental impacts may result from sourcing and transporting materials to the construction site. Main construction materials will be sourced from within the site where feasible, however, it

is likely that gravel, aggregates and rock will be sourced from quarries within a 65km radius of the site and other construction materials may need to be sourced outside this radius, including internationally. This may lead to increased construction traffic which could affect Human Receptors due to changes in Air Quality, Noise Levels and increased congestion. Measures to manage material sourcing impacts from a waste and materials perspective are identified in this section. In addition, impacts resulting from increased traffic are further assessed in Chapters 5, 11 and 13.

Other impacts associated with material use comprise handling and storage. If not appropriately stored and contained, materials could result in contamination of the environment.

14.4.1.2 Waste Generation

This section describes the potential impacts as a result of waste generation from the Scheme.

Construction waste is likely to include:

- Excess spoil from earth and enabling works at foundations for Electrical Substation and Telecommunication masts and drainage works;
- Redundant building materials such as asphalt, concrete, bricks, and steel resulting from the construction of buildings and structures such as the WWTW, Solid Waste Facility, foundations for Electrical Substation and Telecommunication masts, drainage works, railway connection, highways and lighting; and
- Excess and waste electric cabling and pipes from the construction of the electric supply lines and water network.
- Household and sanitary waste arising from worker's welfare facilities

The previous feasibility study identifies a risk of illegal waste dumping during construction activities. Also, other ESIAs for individual plots indicate a risk of open, uncontrolled burning of household waste as a disposal method (e.g. Bajaber Industries Limited, ESIA 2017).

It has been reported that common practice among construction companies at other schemes with large construction waste arisings includes dumping of excess construction materials and wastes in nearby environmentally-sensitive areas. Uncontrolled waste disposal affects the local amenity, soil and water quality, and consequently flora and fauna, as well as human health.

Some areas of the KIBP that is proposed to be developed is currently used as an unauthorised waste dump (fly-tipping). Local, uncontrolled burning of household waste was also confirmed during a site visit undertaken in April 2019. Uncontrolled waste burning affects air quality and ultimately, human health.

Wastewater arising from temporary construction compounds may lead to pollution of ground water and surface water, as well as ground pollution. Mitigation measures relating to waste management will need to be implemented to minimize this impact. Furthermore, this impact is addressed in Chapter 15 and so impacts upon the water environment are not considered further within this materials and waste assessment.

Temporary storage of hazardous and inert waste materials presents a risk of air- and ground pollution if not appropriately stored and managed.

Significant amounts of waste being transferred to landfill may result in landfill depletion.

Finally, increased traffic due to materials being transported off site may impact on air quality and therefore, ultimately on human receptors (health) and biodiversity (habitat degradation).

14.4.2 Operation Impacts and Effects

As detailed in Section 2.4, a solid waste facility will be located in the southern part of the South B Sector. This facility will primarily serve as a waste transfer station and sorting facility and is intended to process waste arising from the operations of future and present occupiers of the park in addition to waste generated to the operation of the proposed development (i.e. the infrastructure element of KIBP).

14.4.2.1 Expected Waste Volumes and Types relevant for the Operation of the Solid Waste Facility:

Waste arisings from the operational phase of the Scheme have not been quantified at this stage. A waste survey will be undertaken at detailed design stage to quantify expected waste arisings and types (see Appendix 2.2). However, considering the proposed land uses, waste arisings are expected to result from the following industrial and business activities:

- Agro-processing;
- Heavy and light industry;
- Logistics;
- Institutional;
- Civic;
- Business, commercial and leisure; and
- Information and communication technology.

The solid waste management facility will need to consider the types of waste likely to arise from current and future occupiers to allow enough capacity to be able to receive and process waste generated within the park. However, it is understood that each occupier will present their own waste strategy prior to occupation and will be responsible for the disposal of their waste through suitably licensed contractors and therefore, waste generated from the above uses is not considered further in this assessment.

Lagan Dott JV has included the development of a Solid Waste Management Strategy for the site within their Design Proposal Report (see appendix 14.1). This strategy will consider the following waste material types and it is understood that these relate to both, waste arising during the operation of the proposed development as well as waste generated by future:

- Aerosol cans;
- Aluminium (cans, scrap, sheet, other);
- Batteries (lead acid and household);
- Biomedical (hazardous);
- Concrete and cement;
- Composite construction and demolition debris (concrete);
- Fabric;
- Food waste;
- Glass (bottles and scrap);
- Lamps and ballasts;
- Metal scrap (ferrous and non-ferrous);
- Non-hazardous chemicals;
- Old corrugated containers (cardboard);

- Paint;
- Paper;
- Plastics;
- Rubber;
- Sludge;
- Stone, clay or sand;
- Used oil; and
- Wood.

A separate ESIA for the Solid Waste and Waste Water Treatment Facilities will be issued when the design for these elements of the proposed works is sufficiently progressed. Therefore, potential effects and mitigation measures to minimise impacts resulting from the construction and operation of the proposed Solid Waste and Waste Water Treatment Facilities are not considered further in this Section.

As such, operational impacts assessed in this chapter are limited to those resulting from waste arising due to the operation and maintenance of the remaining elements of the proposed Scheme, namely:

- An electrical substation and supply lines;
- Telecommunications;
- Road works, including the associated ancillary works such as road marking, roadstuds;
- Lighting;
- Bridge works;
- Drainage;
- Potable water supply;
- Facilities for small and medium-sized enterprises; and
- Railway connections.

As such, waste arising from the operation of the proposed development is likely to be limited to spare parts and consumables used during maintenance works as well as commercial and household waste collected in public rubbish bins within the newly established infrastructure (e.g. in the freight village, car parks, railway sidings and bus stops) and from the facilities for small and medium sized enterprises.

There is a risk of illegal and uncontrolled waste dumping if the waste disposal of the park's occupiers is not appropriately managed.

Inappropriate storage of hazardous and non-hazardous materials may impact on sensitive receptors within the site. Inappropriate storage or household waste (e.g. overfilled bins or storage containers without proper lids) may lead to rubbish piling up on streets which could impact on the landscape and visual amenity and attract pests which could affect human health.

Significant amounts of waste being transferred to landfill may result in landfill depletion. However, it is anticipated that waste arisings from the operation and maintenance of the infrastructure and facilities within the scope of this assessment will present a small percentage of waste arising from the currently operational KIBP, therefore it is considered unlikely the proposed operational activities will put unmanageable pressure on the existing landfills within the area.

Inappropriate handling of hazardous waste may result in leakage of toxic materials into soils and watercourses which could ultimately affect human health and biological habitat.

The risk of pollution to sensitive receptors may be higher during certain weather conditions. Storage of materials will be appropriate during all typical weather conditions including rainfall and wind events.

14.4.3 Summary of pre-mitigation construction and operation impacts and effects

A summary of the pre-mitigation potential waste and materials impacts and effects are shown in Table 14.1. Those that are moderate, or major are considered significant. This table does not include secondary impacts covered in other sections.

Table 14.1: Summary of potential impacts and effects for waste and resources, pre-mitigation

Receptor	Summary of Impact / Activity	Adverse/ Beneficial	Temporary/ Permanent	Impact Magnitude	Sensitivity of Receptor	Effect Evaluation	Significance of Effect
Construction phase							
Biodiversity, Air Quality	Material use – exploitation and sourcing of construction materials	Adverse	Temporary	Moderate	Medium	Moderate	Significant
Human Receptors, Landscape, Biodiversity, Surface Water Bodies, Soil, Groundwater	Material use –handling and storage	Adverse	Temporary	Major	Medium	Major	Significant
Human Receptors, Landscape, Biodiversity, Surface Water Bodies, Soil, Groundwater	Waste generation –handling and storage	Adverse	Temporary	Major	Medium	Major	Significant
Human Receptors, Landscape, Biodiversity, Surface Water Bodies, Soil, Groundwater	Waste generation – illegal waste dumping	Adverse	Temporary	Moderate	Medium	Moderate	Significant
Human Receptors, Biodiversity, Air Quality	Waste generation – informal waste incineration	Adverse	Temporary	Minor	Medium	Minor	Not Significant
Soil, Biodiversity, Human Receptors	Waste generation – depletion of landfills	Adverse	Permanent	Major	High	Major	Significant
Operational phase							
Human Receptors, Landscape, Biodiversity, Surface Water Bodies, Soil, Groundwater	Infrastructure: illegal waste dumping	Adverse	Temporary	Moderate	Medium	Moderate	Significant
Human Receptors, Landscape, Biodiversity, Surface Water Bodies, Soil, Groundwater	Infrastructure: Inappropriate handling and storage of non-hazardous waste	Adverse	Temporary	Moderate	Medium	Moderate	Significant
Human Receptors, Landscape, Biodiversity, Surface Water Bodies, Soil, Groundwater	Infrastructure: Inappropriate handling and storage of hazardous waste	Adverse	Temporary	Major	High	Major	Significant
Soil, Biodiversity, Human Receptors	Waste generation – depletion of landfills	Adverse	Permanent	Major	High	Major	Significant

14.4.4 Mitigation Measures

A number of mitigation measures have been identified to mitigate potential impacts resulting from the use of materials and handling of waste.

Table 14.2 presents a summary of both construction and operational mitigation measures.

14.4.4.1 Construction:

Existing waste dumped on the site presents health and environmental risk if not removed of site through a suitably licensed waste contractor prior to commencement of works.

A Materials Management Plan (MMP) will be issued once the “Engineering Design of Critical Infrastructure” is complete and prior to commencement of construction. The MMP will include a bill of quantities detailing types and amounts of materials required as well as details of the sourcing of materials, include provider and location of procurement. This may be part of the Engineering Design Report.

Provisions for the management of contractor’s procedures for dealing with waste and a waste management plan including information on the final disposal site/landfill will reduce the risk of illegal waste dumping. This can be presented in form of a Construction Waste Management Plan.

In summary, mitigation measures during construction include:

- Removal of existing waste through suitably licensed contractor;
- Preparation and implementation of a MMP; and
- Construction Waste Management Plan.

14.4.4.2 Operation:

In order to appropriately manage waste arising from the operational development, a waste survey will be undertaken identifying the types of waste arising from each activity on site as well as estimated quantities. Further, a Site Waste Management Strategy (SWMS) will be issued, identifying a waste handling infrastructure within the site considering the waste hierarchy of reducing re-using and recycling materials and finally waste processing and disposal sites for each waste stream. The SWMS should be included in the finalised ESMP.

PEC[86] outlines the SWMS as follows:

Three stages of solid waste management are defined:

- Generation,
- Collection and transportation; and
- Final disposal.

In developing a suitable and sustainable solid waste management strategy, the detailed design will consider the following options: -

i. Source reduction - through engineering process modifications. For example, the company could work with their customers to eliminate the use of particular containers and switch to biodegradable containers.

[86] Email to Mott MacDonald 29/04/2019.

ii. In-process recycling - develop a separation method to use the waste as a raw material for the same process. For example, the company could collect the metal scrap and attempt to process it again in the same process.
iii. On-site recycling - develop a separation method to use the waste as a raw material for another in-house process.
iv. Off-site recycling - develop a separation method and transport the waste to another organization so that another company could use the waste as a raw material.
v. Waste treatment to render the waste less hazardous - develop a separation method and treat the waste so it is less harmful before releasing it to the environment. This may involve changing it into liquid and treat it as wastewater.
vi. Secure disposal - dispose of the waste at a secure landfill.
vii. Direct release to the environment - develop a separation method and release the waste directly to the environment; where the solid waste is biodegradable.

The above outlined SWMW will be enhanced and developed to increase waste reduction and avoid the risk of inappropriate waste disposal. Provisions should be made for the management of contractor's procedures for dealing with waste on a day to day basis and the SWMS should include information on the final disposal site/landfill:

- Operational Waste Management Plan (OWMP) – The Waste Management Strategy mentions lorries will collect the rubbish. What Waste containers will be provided, how will hazardous waste be collected, will it be separated at source etc.
- Detail on licenced waste contractors should be included to increase re-use and recycling of materials and to minimise in-appropriate disposal of hazardous waste.
- A list of NEMA approved landfills and their location in relation to the Scheme.

Table 14.2 summarises key details of the proposed mitigation measures.

Table 14.2: Materials and waste mitigation and enhancement measures

Type of measure	Detail
Embedded mitigation – mitigation which is built in to Scheme during the design and procurement process	Waste Handling Facility: The Waste Handling Facility forming part of the design proposals will provide opportunities to reduce, reuse and re-cycle waste arising within the operational KIBP, thus reducing pressure on local landfills and waste handling facilities that could otherwise result due to the expansion of KIBP. The MMP will include a bill of quantities detailing types and amounts of materials required as well as their details of the sourcing of materials include provider and location of procurement.
Mitigation of significant effects	SWMP – The implementation of a SWMP through the appointed contractor set out measures to appropriately handle and dispose of waste generated during construction. This will help to reduce waste at the source and reduce the risk of fly-tipping and informal waste incineration. SWMS including OWMP - The site waste management strategy will set responsibilities and measures to handle during operation of the proposed Scheme on a day to day basis. In particular, this should include details on licenced waste contractors and landfills appointed to process the waste, details of waste containers, rubbish collection vehicles and a collection strategy (OWMP),
Mitigation of non-significant effects	Informal waste incineration during construction can have significant effects on air quality and therefore ultimately on human health and ecological habitats, however waste incineration within the site during construction would be temporary and therefore considered not significant. Nevertheless, this impact may affect the health of human receptors within the vicinity of the site and further afield. The implementation of a detailed Site Waste Management Plan will ensure waste is appropriately managed in line with NEMA legislation and will help to reduce this impact.
Enhancement measures	None

14.4.5 Residual Impacts and Effects

Residual effects are those that remain after mitigation and/or enhancement measures have been implemented. A summary of impacts considered to be minor adverse after application of mitigation and/or enhancement measures is presented in Table 14.3.

Table 14.3: Residual impacts and effects for waste and resources after application of mitigation

Receptor	Summary of Impact	Adverse/ beneficial	Temporary/ Permanent	Magnitude of Impact	Sensitivity of Receptor	Effect Evaluation	Significance of Effect
Construction phase							
Biodiversity, Air Quality	Material use – exploitation and sourcing of construction materials	Adverse	Temporary	Minor	Medium	Minor	Not significant
Human Receptors, Landscape, Biodiversity, Surface Water Bodies, Soil, Groundwater	Material use –handling and storage	Adverse	Temporary	Minor	Medium	Minor	Not significant
Human Receptors, Landscape, Biodiversity, Surface Water Bodies, Soil, Groundwater	Waste generation – handling and storage	Adverse	Temporary	Minor	Medium	Minor	Not significant
Human Receptors, Landscape, Biodiversity, Surface Water Bodies, Soil, Groundwater	Waste generation – illegal waste dumping	Adverse	Temporary	Minor	Medium	Minor	Not significant
Human Receptors, Biodiversity, Air Quality	Waste generation – informal waste incineration	Adverse	Temporary	Minor	Medium	Minor	Not Significant
Soil, Biodiversity, Human Receptors	Waste generation – depletion of landfills	Adverse	Permanent	Minor	High	Moderate	Significant
Operational phase							
Human Receptors, Landscape, Biodiversity, Surface Water Bodies, Soil, Groundwater	Infrastructure: Illegal waste dumping	Adverse	Temporary	Minor	Medium	Minor	Not significant
Human Receptors, Landscape, Biodiversity, Surface Water Bodies, Soil, Groundwater	Infrastructure: Inappropriate handling and storage of non-hazardous waste	Adverse	Temporary	Minor	Medium	Minor	Not significant
Human Receptors, Landscape, Biodiversity, Surface Water Bodies, Soil, Groundwater	Infrastructure: Inappropriate handling and storage of hazardous waste	Adverse	Temporary	Minor	High	Moderate	Significant
Soil, Biodiversity, Human Receptors	Waste generation – depletion of landfills	Adverse	Permanent	Minor	High	Moderate	Significant

15. Water Resources

15.1 Introduction

15.1.1 Overview

This chapter considers the potential water impacts associated with the construction and operation of the infrastructure associated with the KIBP in accordance with IFC guidelines. Key potential sources of water pollutants which could affect the health of local receptors and / or amenity have been considered.

This assessment describes the methodology used to assess water resources, identifies the Area of Influence, its baseline and the sensitive receptors within it, and presents an assessment of the potential impacts to identify where significant effects are expected to arise.

15.1.2 Study Area and Area of Influence

The Area of Influence with regard to water and water quality is the area that could potentially be affected by pollution to water during the construction, operational and decommissioning phases.

Key potential sources of water pollutants which could affect the health or amenity of receptors have been considered. The areas of impact for each of the work phases will be the water features within the KIBP, including wetlands, drainage channels, streams and groundwater. For surface waters, the area of influence will be those within the KIBP and downstream of the site. This will include the wetlands immediately downstream of the KIBP and Lake Victoria, which is the receiving water body for the Namanve River that runs through the site. For groundwater, the area of influence could span much wider, depending on the groundwater catchment area and flow of water.

15.2 Methodology

15.2.1 Applicable Guidelines and Standards

15.2.1.1 The Water Act, Cap. 152

Uganda's Water Act Cap 152 provides for the use, protection and management of water resources and supply; and facilitates the devolution of water supply and sewerage undertakings. Its objectives are to:

- Promote the rational management and use of the water resources of Uganda by:
  - Use of appropriate standards and techniques for the investigation, use, control, protection, management and administration of water resources.
  - Coordinating all public and private activities which may influence the quality, quantity, distribution, use or management of water resources.
  - Coordinating, allocating and delegating responsibilities for the investigation, use, control, protection, management or administration of water resources.
- Promote the provision of a clean, safe and sufficient supply of water for domestic purposes.
- Ensure appropriate development and use of water resources other than for domestic use, e.g. watering of stock, irrigation and agriculture, industrial, commercial and mining uses,

generation of energy, navigation, fishing, preservation of flora and fauna and recreation in ways which minimise damage to the environment.

- Control pollution and promote the safe storage, treatment, discharge and disposal of waste, which may pollute water or otherwise harm the environment and human health.

According to the National Water Policy (1999) and the Water Act Cap 152, the responsibilities to provide water services and to maintain facilities are devolved to local councils in districts and urban centres, with full mandates to construct, acquire or alter any water supply work. The role of the Central Government's Agencies is that of guiding and supporting as required. The Act thus emphasises the shared responsibilities in development and management of water resources among stakeholders (including the Private Sector and NGOs) to regulate human activities that can pose risks to water resources. It also provides for pollution control measures with associated penalties and fines.

15.2.1.2 The National Environmental Act, Cap. 153

The National Environmental Act provides for "sustainable management of the environment; to establish an authority as a coordinating, monitoring, and supervisory body for that purpose; and for other matters incidental to or connected with the foregoing."

The Act makes provision for a tiered approach to environmental planning, commencing with a National Environmental Management Plan to be prepared and reviewed every five years. Each district is required to compile a district environmental action plan every three years that compliments the National Environmental Management Plan. Both of these plans are made available to the public. At a project scale, the Act stipulates that developments of a certain nature (as determined under Section 19(7) of the Act) are required to undertake detailed Environmental Impact Assessment process in a prescribed manner.

The Act also makes provision for the monitoring of air and water quality and makes provision for the establishment and implementation of minimum standards pertaining to emissions and effluent.

Section 34 of the Act deals specifically with limitations in the use of rivers and lake systems and aims to minimise the negative impacts and control activities that have the potential to be detrimental to these systems. The Act goes on to make specific provisions for the protection of river banks and lake shores in Section 35 and protection and management of wetland systems in Section 36 and 37 respectively.

15.2.1.3 National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations, 1999

Section 6 (2) details maximum permissible limits for 54 regulated contaminants which must not be exceeded before effluent is discharged into water or on land.

For this Scheme, this standard is appliance to disposal of industrial wastewater from the KIBP.

Table 15.1: National discharge standards for selected pollutants

Parameter	National discharge standards
BOD5 (mg/l)	50
Suspended solids (mg/l)	100
Faucal coliforms	10,000 counts/ 100ml
Chlorine residual (mg/l)	1 mg/l
pH	6-8

Parameter	National discharge standards
Phenols (µg/l)	0.2 mg/l
Oil and grease (mg/l)	10 mg/l
Total Phosphorus (mg/l)	10 mg/l
Temperature	20-35°C

Source: Ugandan National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations, 1999

15.2.1.4 National Environment (Waste Management) Regulations, 1999

These regulations require waste disposal in a way that would not contaminate water, soil, and air or impact public health. The regulations aim to prevent and regulate discharge of waste to air, water and land require establishing a system of waste planning and management.

The industrial park shall have waste treatment facilities within the park however if any waste is to be transported out of the park, according to the regulations, waste haulage and disposal should be done by entities licensed by NEMA.

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

The national policy for the conservation and management of wetland resources (1995) is aimed at restricting the continued loss of wetlands and their associated resources and aims to ensure that benefits derived from wetlands are sustainably and equitably distributed to all people of Uganda. The wetlands policy calls for:

- No drainage of wetlands unless more important environmental management requirements supersede;
- Sustainable use to ensure that benefits of wetlands are maintained for the foreseeable future;
- Environmentally sound management of wetlands to ensure that other aspects of the environment are not adversely affected;
- Equitable distribution of wetland benefits; and
- The application of environmental impact assessment procedures on all activities to be carried out in a wetland to ensure that wetland development is well planned and managed.

Wetland related issues have been incorporated into the National Environmental Statute 1995. The Wetlands Policy is strengthened by a supplementary law specifically addressing wetland concerns. Wetland resources are regarded as forming an integral part of the environment and is recognised that present attitudes and perceptions of Ugandans regarding wetlands be changed. Wetland conservation requires a co- ordinated and cooperative approach involving all the concerned people and organisations in the country, including the local communities.

Within the context of the guiding principles, the National Wetlands Policy set five goals:

- To establish the principles by which wetland resources can be optimally used over time;
- To end practices, which reduce wetland productivity;
- To maintain the biological diversity of natural or semi-natural wetlands;
- To maintain wetland functions and values; and
- To integrate wetland concerns into the planning and decision making of other sectors.

15.2.2 Field Surveys

A site visit was made on 2 April 2019, accompanied by personnel from Q&L, Lagan-Dott JV, who are the appointed construction contractor, and a representative from the UIA. The representative from the UIA confirmed that flooding has been experienced on the KIBP site, particularly along

the Namanve River where the culverts are located. Effluent discharge can also make up a significant portion of the flow through the site. It was also confirmed that illegal sand mining operations were also occurring on particular areas of the site.

The site lies within a basin on the edge of Lake Victoria, surrounded by higher areas of ground to the north, east and west. The Namanve River runs through the KIBP site for around 5km, before discharging into wetlands, which eventually flows into Lake Victoria, which is due south of the KIBP site. The identification of these water features will also enable an appropriate selection of water quality points to sample before construction commences, in order to establish baseline conditions.

15.2.3 Determining Magnitude, Sensitivity, and Impact Significance

Please see the following sections of the main ESIA report:

- Section 4.8.1 4.8.1 - Magnitude Criteria
- Section 4.8.2 - Sensitivity Criteria
- Section 4.8.3 - Evaluation of Effects

15.2.4 Limitations and Assumptions

Please see the following sections of the main ESIA report:

- Section 4.11 - Uncertainty

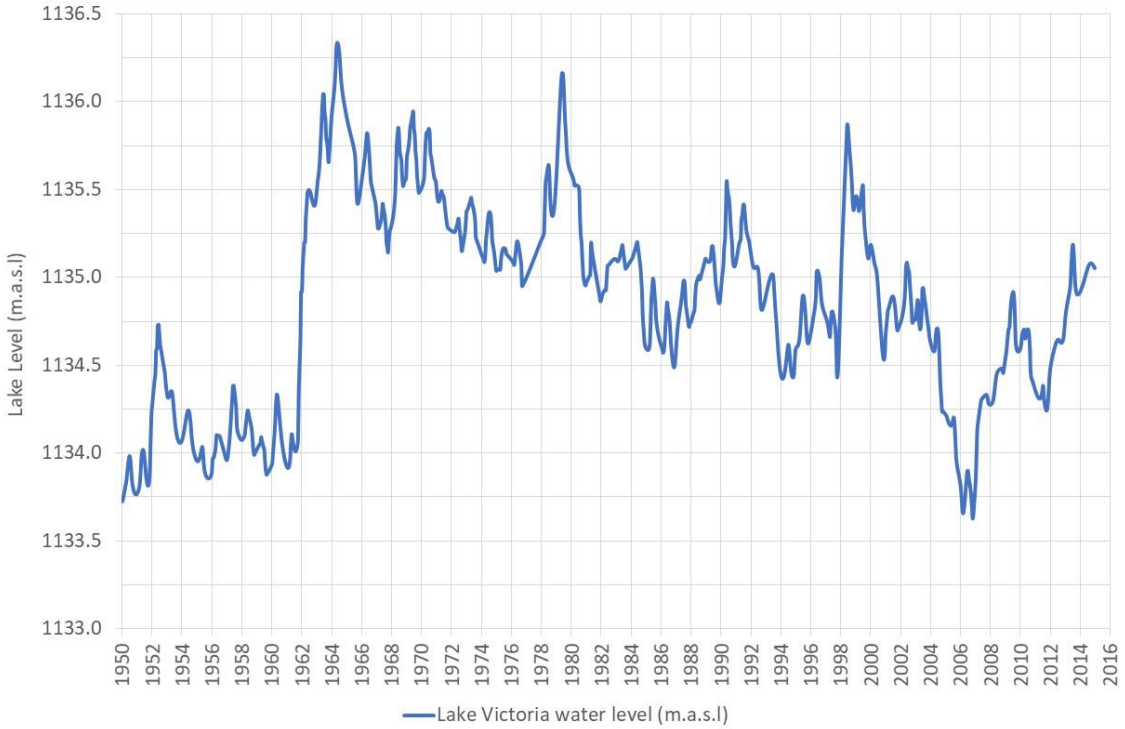
15.3 Baseline

15.3.1 Surface Water Hydrology

15.3.1.1 Water resources

The KIBP falls within the Lake Victoria water management sub-basin, which is the largest sub-basin unit within Uganda. The KIBP area borders Lake Victoria, which is the country's largest lake, and is recharged mostly during the two main wet seasons (March to May and September to December). The water level in Lake Victoria has shown a significant downward trend since 1998, culminating in an 80-year low in October 2006 (see Figure 15.1). Since 2006, however, the lake levels have risen back up to pre-1998 water levels (Republic of Uganda Ministry of Water and Environment, 2014).

Figure 15.1: Lake Victoria water level at Jinja pier 1950-2015



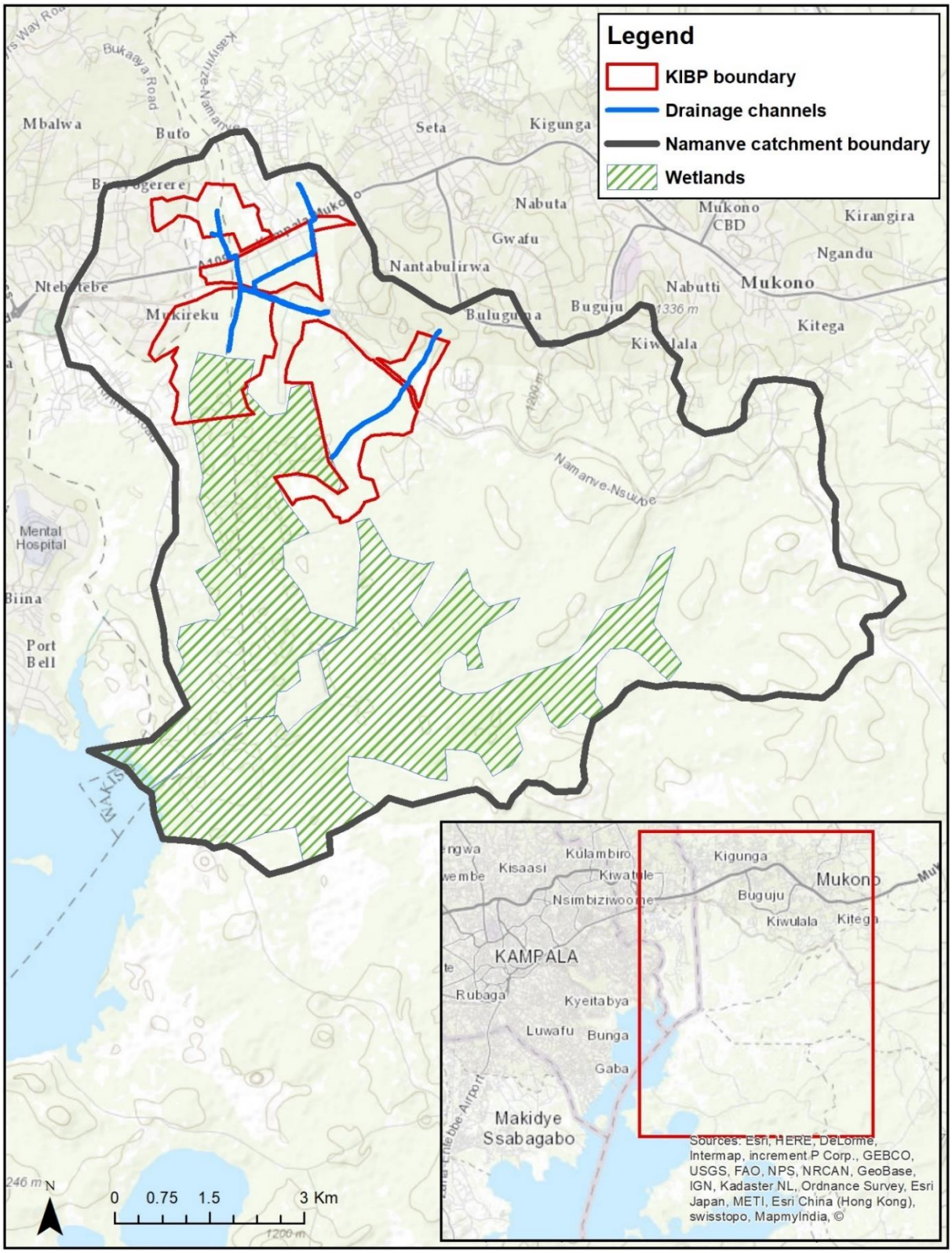
Source: Data extracted from Vanderkelen, I., van Lipzig, M., Thiery, W. (2018)

The Namanve catchment is the largest drainage area discharging into Lake Victoria within the Inner Murchison Bay, with the Namanve River running through the KIBP site for around 5km. The catchment area is 86.7km², with around 25% made up of wetland areas (Uganda Investment Authority, 2004 and EMA Consult Ltd, 2008).

15.3.1.2 Local Drainage Patterns

The Scheme site is located in the Namanve catchment and drains into Lake Victoria within Murchison Bay. The catchment is bordered by the hills of Bukasa, Kirinya, Mukireku and Kazinga to the west, Bbuto, Kiwanga, Namanve and Nantabulirwa to the north, and Namilyango, Degeya, Senyi and Zanga Island to the east. The Namanve River flows through a road culvert on Kampala/Jinja highway, which can be subject to flooding during the rainy season. The river course straightens within South A and South B (Figure 15.2) before reaching an area of thick vegetation. It then crosses beneath the Mombasa/Kampala railway and the old Jinja Road via a culvert and broadens out into the wetland area. The major wetlands that drain into Lake Victoria include Kayobe and Namanve/Bumbulumbu. Two further wetlands within the KIBP drain into the Victoria Nile called Nakiyanja and Wankongolo. This area is characterised by typical wetland vegetation, including papyrus and is the area of slowest flow (EMA Consult Ltd, 2008).

Figure 15.2: KIBP drainage channels and wetland



Source: Mott MacDonald (2019)

15.3.1.3 Water quality

During periods of dry weather, the flow from the KIBP catchments are typically made up of groundwater springs (Uganda Investment Authority, 2004) and effluent discharge further upstream. Baseline information on surface water quality was included in the 2008 ESIA for two locations on the Namanve River. Table 15.2 below provides the results of the water quality from the previous ESIA, along with more recent water quality sample results taken in May 2019 by Queensland and Leeds.

Table 15.2: River Namanve water quality comparison

	2008		2019	
Sampling point	**Kampala-Jinja Highway**	**Railway crossing**	**Kampala-Jinja Highway**	**Railway crossing**
pH	7.4	7.0	7.95	8.04
Total suspended solids at 105oC (mg/l)	31	23	52	74
Electrical conductivity (uS/cm)	601	292	196	228
Calcium hardness as CaCO3 (mg/l)	33	35	95.7	115.8
Total Iron (mg/l)	3.45	4.59	0.01	0.01
BOD5 (mg/l)	5.9	9.5	3	4

Source: EMA Consult Ltd, 2008 and Q&L (2019)

The results in 2019 show differences to those taken in 2008. The pH at both Namanve River locations are slightly more alkaline than previously recorded. Total suspended solids are also markedly higher, which is of concern due to the protentional for siltation within the drainage channels. The calcium hardness is also noticeably higher in the more recent results, although iron is lower. BOD is also slightly lower than previously recorded. Further water quality results are presented below.

15.3.2 Groundwater

A number of boreholes have been identified in the vicinity of the KIBP, although some of these are not functional due to water quality issues. It has been made clear that no groundwater sources are currently active on the KIBP site, however, research suggests that the Coca-Cola plant has, or did have, an on-site borehole (Uganda Investment Authority, 2004). At the time of the 2008 ESIA, there were no known groundwater sources downstream of the Scheme site (EMA Consult Ltd, 2008). The groundwater level is shallow over the KIBP site, and there are locations where the water table is at the surface (Hima Cement Ltd, 2016).

Three groundwater springs were identified near the southern area of the KIBP and are presented in Figure 15.3 below. The springs are clearly used by the local population and are located at:

- Latitude 0.340988, Longitude 32.705877
- Latitude 0.360403, Longitude 32.700961
- Latitude 0.322224, Longitude 32.704485

Figure 15.3: Groundwater springs on the border of the KIBP site

Source: Queensland and Leeds (2019)

15.3.2.1 Water quality

From existing literature and onsite visits, it was established that there are no existing contamination sites and/ or dumping sites within the Scheme area. This was verified at a meeting with the UIA, just outside of the KIBP site on 2nd May 2019. This decreases the risk of groundwater contamination due to disturbances of the soils containing contaminants or diversion of flow paths for contaminants within the area, however, it cannot be ruled out that certain industry operations may result in a contamination risk within the site. Further water quality results are presented below.

15.3.3 Flooding

The KIBP site is likely to be at risk from high intensity rainfall events that occurring within the site itself and the small contributing catchment of the Namanve River. This may be exacerbated by high water levels in Lake Victoria. Flood risk may increase in the future a result of climate change impacts on rainfall intensities.

The KIBP has a relatively small upstream catchment area, and therefore the total volume of water from storm events entering the site will be relatively small, though this needs to be appropriately accommodated for within the drainage design as it currently drains into the site quickly though concrete drainage channels. There is a good network of drainage channels within the site already, though the size of these and their respective capacities are not well known. It is likely that given the previous reports of flooding following high intensity rainfall events these do not offer adequate capacity. Vegetation growth and deposition of sediment within the channels, causing siltation and blockages, will increase the risk of flooding.

The development of KIBP itself may also contribute to flood risk issues. Flooding may be exacerbated by the construction of concrete drainage channels which will speed up the onset of flood response flooding and the introduction of hardstanding in site areas will increase the runoff proportion. Potential loss of wetland areas within the site with the construction of impermeable areas will also reduce available areas for the storage of floodwater as well as valuable habitat.

There are therefore several scenarios in which flooding could impact the KIBP as follows:

- Undersized channels and culverts within and adjacent to the KIBP site;
- Sediment blockages within the drainage channels;
- Vegetation slowing the flow of water through the site;
- Ponding and lack of site drainage; and
- High water levels in Lake Victoria causing backwater effects within the site.

15.3.3.1 Undersized drainage channels and culverts

Several culvert structures are in existence within the KIBP. These culverts appear to be too small to handle the flow and volume of water that the KIBP often experiences, significantly reducing the flow of water through the site. Backing-up of water at these culverts has been observed by Q&L during their site visit in April 2019, causing backing-up and increased water levels within the drainage channels.

In addition to the culverts, the channels themselves may also be undersized, though at this stage it is not possible to comment as to which ones and to what extent this is a problem.

15.3.3.2 Sediment blockage

As mentioned in the previous section, sediment blockages are likely to be caused by high intensity rainfall events, which have the capacity to erode large amounts of sediment and debris from the surface of the catchment and carry as suspended solids transport it into the drainage channels. Upon entering the channels, the flow rate rapidly decreases due to the reduced slope and causes the resulting in sediment load to be deposited resulting in siltation deposition and siltation in the channel. Over time this reduces the volume of water the channels can accommodate.

Further sediment sources within the channels may arise from fast flowing water eroding into the channel walls sides. This has been observed to be steep-sided and unprotected in several locations within the KIBP where steep unprotected channel sides may collapse creating blockages and contributing material to the channel. and may lead to the collapse of the channel sides, blocking the channels.

15.3.3.3 Vegetation growth

The most likely source of reduced channel efficiency is the growth of vegetation within the channel and the channel sides. On-site observations have confirmed the existence of thick vegetation within the Namanve River as it flows from north to south through the KIBP. This reduces the volume and flow of water within the channel, thus increasing the water level within the channel and likelihood of out-of-bank flow and flooding.

Provided there is adequate sizing and hydraulic design of channels the growth of vegetation may be accommodated as part of a more natural flood solution. However, vegetation growth will reduce the design performance of channels that were intended to be concrete lined or vegetation free.

15.3.3.4 Ponding and lack of surface drainage

Ponding of surface water is likely within the KIBP due to the low site gradient, impermeable surfaces, and high groundwater level. Further ponding was observed during the site visit at the edges of the KIBP, due to man-made craters excavations caused through the illegal mining of sand (Figure 15.4). These areas currently lack any surface drainage to allow the flow of water through the KIBP.

Figure 15.4: Sand mining at the northern edge of the KIBP

Source: Mott MacDonald (2019)

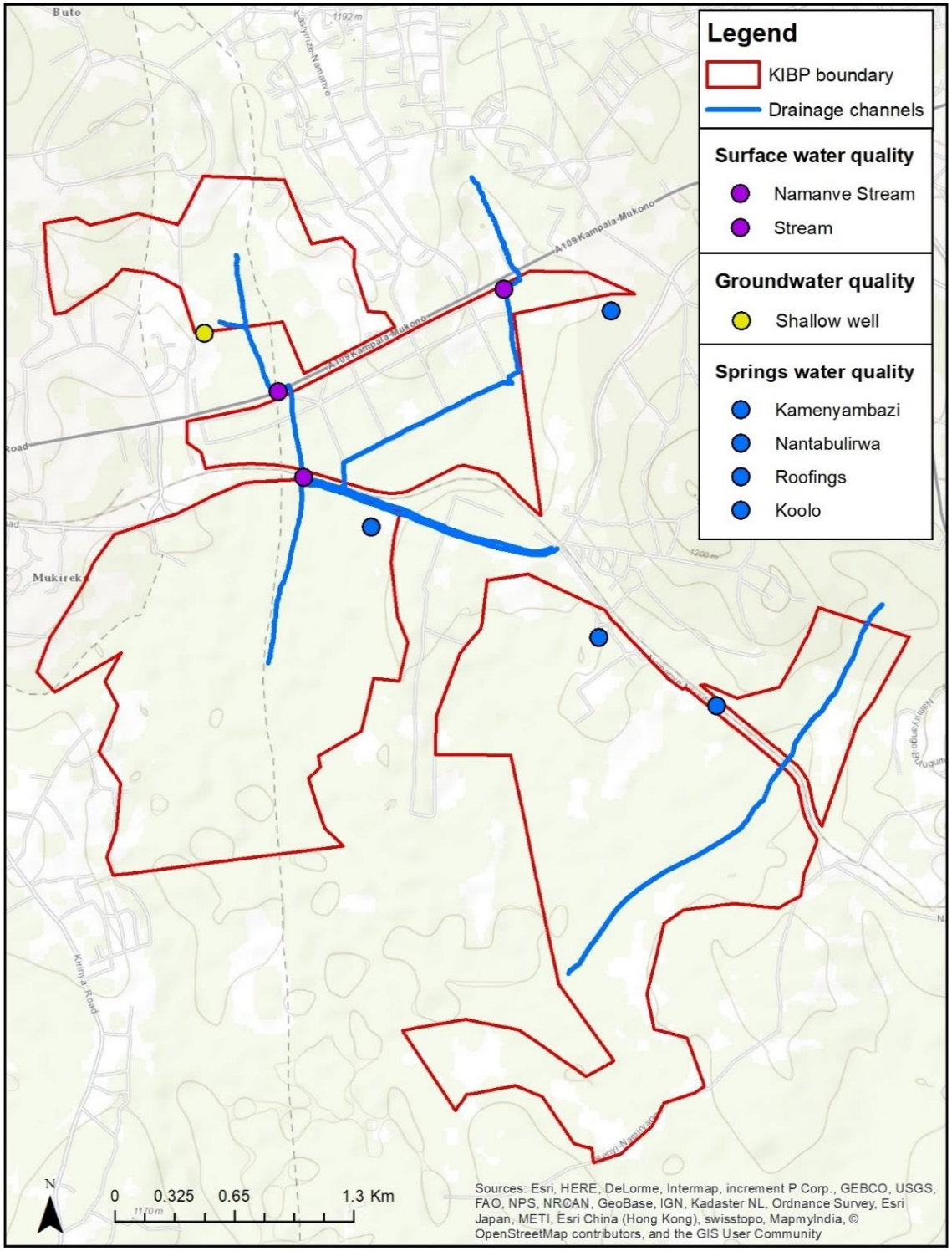
15.3.3.5 Backwater effects

The KIBP is planned to be situated just above the historic Lake Victoria maximum water level of 1136.3m.a.s.l. (recorded in 1964 at Jinja). However, there is still a concern that an increase in Lake Victoria water levels could result in backwater effects on-site (EMA Consult Ltd, 2008). This is caused by the raised lake levels essentially blocking the outlet from the Namanve River into the wetland areas downstream of the site, causing water to back-up through the channels in the site.

15.3.4 Water quality

Onsite water quality readings and water samples were taken by Q&L on 23 May 2019 at 8 locations in the vicinity of the KIBP site (see Figure 15.5). The water quality samples were taken at surface drainage channels, groundwater wells and protected springs.

Figure 15.5: Water sample and quality collection points



Source: Mott MacDonald (2019)

The water quality results have been divided between in-situ readings, and the laboratory results from water sample collections in Table 15.3 below.

Table 15.3: On-site and laboratory water quality results (taken 23 May 19) (see Appendix 15.1)

Location	Stream point 1	Namanve Stream point 2	Namanve Stream point 3	Shallow Well	Nantabulirwa Protected Spring	Roofings Protected Spring	Kamenyambazi Protected Spring	Koolo Protected Spring
Easting	466124	464975	465040	464510	466725	466620	467272	465405
Northing	39976	39242	38946	39726	39836	38089	37690	38680
Onsite water quality								
DO%	16.6	18.54	20.3	22.4	14.3	13.6	85.1	21.6
DO (mg/l)	1.2	1.34	1.45	1.62	1.05	1	6.29	1.48
pH	7.67	7.95	8.04	7.11	7.48	6.57	6.33	7.39
Temp	25.18	24.99	25.09	25.24	23.33	24.14	23.93	25.02
Atmospheric Pressure	897.2	899.8	897.9	897.8	896.6	898.9	896.2	899.8
Resistivity	4913	5087	4387	6944	8120	10240	17880	8060
Conductivity	204	196	228	144	123	98	56	124
TDS	102	96	114	72	62	49	28	62
Salinity	0.1	0.09	0.11	0.07	0.06	0.05	0.02	0.06
ORP	-127.6	-127.2	-126.4	-136.6	-131.5	-110.6	-110.5	-136.6
Laboratory water quality								
Apparent colour (PtCo)	2088	942	1602	198	129	21	110	0
Turbidity (FAU)	249	105	174	17	15	0	10	5
Total suspended solids at 105oC (mg/l)	166	52	74	14	0	0	0	0
Total Iron (mg/l)	0.02	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Calcium hardness as CaCO3 (mg/1)	120.8	95.7	115.8	60.7	15.9	65.4	10	31.6
Aluminium (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc (mg/l)	0.02	0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01
Lead (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BOD5 (mg/l)	4	3	4	1	1	1	1	2
COD	15	11	14	6	4	7	3	6
Oil and Grease (mg/l)	767.5	284.5	2039.5	2718	504	299	627	348

Source: Q&L (2019)

The protected springs are generally low in heavy metals and suspended solids, low in turbidity. DO (%) in the Kamenyambazi protected spring is noticeably higher than the other springs and has the highest Oil and Grease reading. All protected springs have high Oil and Grease readings for the fact they are used for drinking water.

The shallow well has similar water quality values to the protected springs, other than higher Calcium hardness and Oil and Grease results.

Of the surface water results, the oil and grease is very high for the Namanve River at the railway. Due to the relative locations of the two Namanve River water quality points, this indicates that the pollution source is within the KIBP. Turbidity and suspended solids are highest in the stream to the east of the KIBP, which joins the Namanve River to the south of the KIBP site.

15.3.5 Hydrology and Storm Water Drainage Scheme Assessment

A previous hydrology and drainage study of the KIBP was conducted by Gibbs in 2002 and thoroughly reviewed by Typsa. The studies were focused on three main hydrological concerns for proposed Namanve Industrial and Business Park.

- Investigation of flooding after heavy rainfall in the Lake Victoria basin and resulting backwater surges in the levels of Lake Victoria, and the effects this will have on the proposed KIBP.
- Investigation of flooding within the KIBP following 'design storms' centred over the site, but assuming the outlet via River Namanve is blocked due to wetlands and swamps.
- Hydrological analyses to define storm intensity-duration curves, design storms' and other relevant parameters to provide the basis for the design of the storm water drainage system for the entire site.

In this study, the maximum historical flood in the Lake Victoria basin as measured by the Directorate of Water Development at Jinja was 1136.3 meters above mean sea level. Using statistical analytical methods, the maximum historical flood contour line within the park development was worked out and consequently no developments are to be made below this line. These plots are expected to be left vacant to be incorporated into the green belt in the centre of the park.

The total runoff from the industrial park during a five year storm event lasting 24 hours was estimated to be 850,000m^3. In the event that 100% of this volume were retained in swamps within KIBP due to blockage in the outlet, the mean flooding depth would be 17 centimetres and would extend over an area of 5 km^2 of low lying wetland. The study showed that this can be safely accommodated within the green belt already designated in the centre of the park. KIBP was designed to have a separate drainage system in which storm water and sewage flows are separated.

Generally, the inclusion of the wetland green belt in the south B portion of KIBP and a properly designed extended detention pond system is very effective in attenuating runoff volumes from the site.

15.3.6 Flood Risk Assessment

A separate Flood Risk Assessment (FRA) has been conducted alongside this report in order to determine the severity of flood risk posed to the site and propose mitigation measures to protect the site from flooding.

A site visit was undertaken in April 2019, which discerned the likely mechanisms for site flooding, as well as being able to gain information relating to past flooding issues. From the observations

and information gained, the drainage channels and culverts are likely to be undersized, while the vegetation growth and continual loss of vegetation due to construction is increasing the risk of flooding and sediment erosion and deposition in the KIBP.

Short duration storm events were estimated using both the guidance within the Road Design Manual Volume 2: Drainage Design, which originally came from a paper by Fiddes, Forsgate and Grigg (1974), and the daily AMAX data collected for Kampala and Jinja. The derived estimates for the 24-hour point rainfall for the 2yr and 100yr events are between 67-71mm and 138-160mm respectively, depending on the methodology used.

A review of climate change impacts suggests that the KIBP will experience increased annual rainfall and increased rainfall intensity, due to increased global temperature and thus moisture holding capacity of the atmosphere. However, it is recommended to sensitivity test the drainage infrastructure for the range of potential climate change impacts to ensure that the design is suitably resilient to floods that exceed the design standard and climate change allowance selected.

It is concluded that the KIBP experiences regular flooding through some or all of the following mechanisms and factors:

- Undersized drainage channels and structures;
- Sediment blockage;
- Vegetation growth;
- Ponding and insufficient drainage networks;
- High Lake Victoria water levels; and
- Site level and backwater effects.

The principal recommendation is for a hydraulic model to be developed for the KIBP as part of a detailed flood risk assessment, although the following mitigation measures have been identified:

- Upstream attenuation through wetland construction;
- Improving drainage system capacity to the following design:
- Enhancing culvert capacities;
- Maintaining vegetation within the channels through regular cutting/trimming, including the stabilisation of channel sides;
- Implementing buffer strips and planting of vegetation for slope stabilisation upstream of the KIBP site;
- Constructing SuDS where possible, such as permeable pavements and swales;
- Further investigation to the pre-1900 Lake Victoria flood to assess the likelihood of a re-occurrence of a similar magnitude event and subsequent assessment of the site level; and
- Relocating high pollution risk activities to the higher site elevations, creating a stepped topographic site within the KIBP, or constructing platforms to raise certain industries that have the potential to cause pollution incidents.

15.4 Assessment of Effects

15.4.1 Introduction

The construction phase for the KIBP will last for approximately three years and will include the necessary mobilisation works, such as site clearance. The main elements that will be constructed as part of the KIBP include:

- Internal road network and bridge
- Water supply
- Water reservoirs
- Sewerage network
- Waste treatment plant
- Power services
- Fibre optic services and CCTV services
- Street lighting
- Ancillary works

The construction of these will include significant amounts of earthworks, rock fill and concreting/road surfacing alongside other potentially dust raising activities.

The site is made up of multiple areas known as North, South A, South B and South C. However, the construction of all areas will take place simultaneously across the whole site rather than in phases.

15.4.2 Construction Impacts

The nature of the activities carried out within the construction phase will be a risk to the water receptors within the KIBP and downstream of the site. The activities have been summarised in Table 15.4.

Table 15.4: Key construction activities and associated impact magnitude

Description of works	Key activities	Impact potential	Duration	Impact magnitude
Site storage facilities	Storage and handling of hazardous materials, such as bitumen, lubricants and fluids (e.g. engine oils, grease, brake fluids, etc), fuels, detergents, paints,	High	> 3 months	Major
Waste disposal	Solid waste disposal, sewage waste disposal, hazardous material disposal.	High	> 3 months	Major
On-site cleaning	Cleaning of vehicles, machinery and equipment in and near to River Namanve, swamps, streams and wetlands leading to spillage of diesel, lubricants (oil and grease), brake fluids, hazardous or poisonous substances.	High	> 3 months	Major
Construction traffic	Dust generation, refuelling, spillages, leaks.	High	> 3 months	Major
Site levelling and construction	Land/vegetation clearance Earthmoving Open excavation Preparation of materials (cutting, grinding) Transport of materials to and within site Re-suspension of dust on unsurfaced roads	High	> 3 months	Major

Source: Mott MacDonald (2019)

The potential for all aspects of the construction phase to cause pollution listed in Table 15.4 above is high and can cause major adverse impacts on the receptors within the KIBP. The potential impact of these works is high due to the network of surface water drainage channels that cover the KIBP, which therefore means that there is often drainage channels within close proximity to any potential work and are prone to pollution incidents. The impact magnitude is

major, as any pollution incidents that impact the surface waters could find its way to Lake Victoria, where it will be very difficult to clean up. Similarly, groundwater aquifers can be contaminated for decades after pollution incidents. Similarly, dust impacts during the site preparation, construction of roads and bridges and construction of other key infrastructure are described as major adverse and are considered significant.

Given the flow of surface waters into areas used for biodiversity and ecosystem services, and human use of surface and groundwater, water resources receptors assessed in relation to the Scheme are all considered to have a high sensitivity.

15.4.3 Operational Impacts

The nature of the activities carried out within the operation phase will be a risk to the water receptors within the KIBP and downstream of the site. The activities have been summarised in Table 1.5:

Table 15.5: Key construction activities and associated impact magnitude

Description of works	Key activities	Impact potential	Duration	Impact magnitude
Buildings and infrastructure	Increased impermeable areas including as industry building roofs, paved/concreted areas, or compacted soils. Loss of vegetation, permeable areas	High	> 3 months	Major
Waste disposal	Solid waste disposal, sewage waste disposal, hazardous material disposal.	High	> 3 months	Major
Industry practices	Storage and handling of hazardous materials, such as bitumen, lubricants and fluids (e.g. engine oils, grease, brake fluids, etc), fuels, detergents, paints. Dust generation, refuelling, spillages, leaks. Cleaning of vehicles, machinery and equipment in and near to River Namanve, swamps, streams and wetlands leading to spillage of diesel, lubricants (oil and grease), brake fluids, hazardous or poisonous substances.	High	> 3 months	Major

Source: Mott MacDonald (2019)

The potential for aspects of the operation phase to cause pollution listed in Table 15.5 above is high and can cause major impacts.

15.4.4 Summary of Pre-Mitigation Construction and Operation Impacts and Effects

A summary of the pre-mitigation potential impacts and effects are shown in Table 15.6.

Table 15.6: Summary of potential impacts and effects, pre-mitigation

Receptor	Summary of Impact	Adverse/ Beneficial	Temporary/ Permanent	Impact Magnitude	Receptor Sensitivity	Effect Evaluation	Significance of Effect
Construction Phase							
Surface waters and groundwater	Spillages and leaks from the storage and handling of hazardous materials, such as bitumen, lubricants and fluids (e.g. engine oils, grease, brake fluids, etc), fuels, detergents, paints,	Adverse	Permanent	Major	High	Major	Significant
Surface waters and groundwater	Improper disposal practices or spillages and leaks of solid waste, sewage and hazardous waste.	Adverse	Permanent	Major	High	Major	Significant
Surface waters and groundwater	Runoff of hazardous or poisonous substances from the cleaning of vehicles, machinery and equipment in and near to River Namanve, swamps, streams and wetlands.	Adverse	Permanent	Major	High	Major	Significant
Surface waters and groundwater	Road and industry traffic, leading to spills and leakages during operation, refuelling and loading/unloading.	Adverse	Permanent	Major	High	Major	Significant
Surface waters	Dust creation and settlement leading to high suspended solid loads within water runoffs and into the River Namanve, swamps, streams and wetlands leading to siltation.	Adverse	Permanent	Major	High	Major	Significant
Surface waters	Increased surface runoff and erosion of topsoil due to the lack of permeable areas	Adverse	Permanent	Major	High	Major	Significant
Operational Phase							
Surface waters	Increased surface runoff due to an increase in impermeable areas including as industry building roofs, paved/concreted areas, or compacted soils, and the loss of vegetation, permeable areas.	Adverse	Permanent	Major	High	Major	Significant
Surface waters and groundwater	Improper disposal practices or spillages and leaks of solid waste, sewage and hazardous waste.	Adverse	Permanent	Major	High	Major	Significant
Surface waters and groundwater	Spillages, leakages and surface runoff of hazardous and poisonous substances from a wide range of industrial practices. Pollutant sources include bitumen, lubricants (oil and grease), and fluids (e.g. engine oils, grease, brake fluids, etc), fuels, detergents, paints.	Adverse	Permanent	Major	High	Major	Significant
Surface waters	Increased surface runoff and erosion of topsoil due to the lack of permeable areas	Adverse	Permanent	Major	High	Major	Significant

15.4.5 Mitigation Measures

This section presents mitigation measures to manage potential water feature impacts during construction and operation. The mitigation measures presented are based on the potential impacts identified above.

15.4.5.1 Construction Mitigation

The assessment has shown that significant water pollution could occur to surface waters and groundwater from a wide range of sources linked to the construction of the KIBP. This section describes specific mitigation measures that will be implemented to prevent and minimise these construction impacts. Preventative measures such as best practice site management and effective site planning/layout will be implemented to minimise the risk of any pollution incidents finding their way to the receptors. A range of remedial or suppressive methods will then also be applied to control these potential adverse activities.

To reduce the risk of substances that are being stored within the KIBP entering any of the water receptors, all such substances should be stored in bunded containers or compounds, with enough volume for at least the spillage of the entire contents of the stored materials. The substances should also be located away from any potential surface water receptors, ideally on raised ground where the likelihood of flooding is reduced.

All forms of waste disposal will be done so following the correct procedures and processes. It is important that this is checked and audited on a regular basis to ensure this is being carried out. Any storage of waste products of sewage will be bunded and on raised ground away from surface water receptors.

Areas specifically designed for the cleaning of equipment, machinery and vehicles will be made available for all construction work within the KIBP. The cleaning shall be carried out on impermeable areas where the collection and disposal of the resulted wastewater is carried out without risk of leakages or spillages.

Areas will be specifically designated for loading and unloading (if concerning toxic substances), including refuelling. These areas shall be impermeable where the collection and disposal of any spills or leaks can be done so easily. Site personnel should take it upon themselves to check incoming vehicles for leakages as they enter and exit the KIBP.

As part of the construction phase, it is expected that significant amounts of dust will be created and re-settled. This process creates a substantial amount of material that will be mobilised through surface runoff and deposited in the drainage channels and the Namanve River at points of particularly low flow, such as at culverts and reaches of thick vegetation. The siltation of the channels can cause flooding problems and reduce the volume of the drainage channels for transporting the resulting flow. The use of water as a dust suppression mechanism may further increase the sediment load entering the drainage channels. The following dust suppression methods will be undertaken to reduce the amount of dust created:

- Minimising dust from material handling sources, such as conveyors and bins, by using covers and/or control equipment;
- Minimising dust from open area sources, including storage piles, by using control measures such as installing enclosures and covers;
- No bonfires and burning of waste materials shall be allowed;

- Planning land clearing, removal of topsoil and excess materials, location of haul roads, tips and stockpiles with due consideration to meteorological factors (e.g. precipitation, temperature, wind direction, and speed) and location of sensitive receptors;
- Designing, installing and applying a simple, linear layout for materials-handling operations to reduce the need for multiple transfer points;
- Compacting and periodically grading and maintaining roads;
- Vegetating exposed surfaces of stockpiled materials.

15.4.5.2 Potential enhancement measures

There are several options that would help mitigate the adverse construction impacts, although it is recognised that these may not be possible for various reasons. It is expected that the channels within the KIBP will have buffer zones adjacent to them, to reduce the load entering the watercourses. However, this may not be possible during the construction phase, and therefore drainage channels may need to be dredged on completion of construction. This may also not be possible due to space requirements, although should be incorporated into the design if feasible.

The increase in surface runoff on the KIBP is not necessarily a major aspect on its own, however, the secondary impacts are significantly adverse. Higher peak flows and faster runoff allows increased mobilisation of suspended solids, pollutants and erosion capability. Soil and vegetation filtration, which may have led to a vastly decreased pollution event, has been replaced with vast impermeable areas. Mitigation options will be considered in the design phase, such as permeable pavements, wetlands/settlement lagoons, swales, and the plantation of trees and vegetation alongside watercourses. These options have the secondary benefit of water filtration and soil stabilisation. Rainwater harvesting collected from roofs may have some impact on peak flows, and the water can be re-used for washing or dust suppression to save on the use of treated water from the supply network.

15.4.5.3 Operation Mitigation

The assessment has shown that significant water pollution could occur to surface waters and groundwater from a wide range of sources linked to the operation of the KIBP. This section describes specific mitigation measures that will be implemented to prevent and minimise these operational impacts. Preventative measures such as best practice site management and effective site planning/layout will be implemented to minimise the risk of any pollution incidents finding their way to the receptors. A range of remedial or suppressive methods will then also be applied to control these potential adverse activities.

To reduce the risk of substances that are being stored within the KIBP entering any of the water receptors, all such substances will be stored in bunded containers or compounds, with enough volume for at least the spillage of the entire contents of the stored materials. The substances will also be located away from any potential surface water receptors, ideally on raised ground where the likelihood of flooding is reduced.

All forms of waste disposal will be done so following the correct procedures and processes. It is important that this is checked and audited on a regular basis to ensure this is being carried out. The site will be connected to the wastewater network to avoid the need for any storage of sewage on site. If any storage of waste products is required, then it will be bunded and on raised ground away from surface water receptors.

The leakage of toxic substances through heavy traffic flow can be mitigated to a certain extent through the inclusion of swales along roadsides. This can help filter out the substances before

they reach the larger receptors, such as the Namanve River, Lake Victoria and the groundwater aquifer. Industries will take it upon themselves to check incoming vehicles for leakages upon entry and exit to their site. Areas will be specifically designated for loading and unloading (if concerning toxic substances), including refuelling. These areas shall be impermeable where the collection and disposal of any spills or leaks can be done so easily.

Higher peak flows and faster runoff will be mitigated with permeable pavements, wetlands/settlement lagoons, swales, and the plantation of trees and vegetation alongside watercourses. These options have the secondary benefit of water filtration and soil stabilisation. Rainwater harvesting collected from roofs may have some impact on peak flows, and the water can be re-used for washing to save on the use of treated water from the supply network.

15.4.6 Residual Impacts and Effects

Residual effects are those that remain after mitigation and/or enhancement measures have been implemented. A summary of effects considered to be minor adverse after application of mitigation and/or enhancement measures is presented in Table 15.7.

Although the likelihood of the impacts will greatly be reduced with the application of mitigation, receptors' sensitivity remains high.

However, the application of mitigation that ensures application of best practice measures means that the impact of spillages, leaks and pollution is reduced to negligible. As this mitigation would remove the likely risk of an incident occurring that could affect water resources, any major spillages would be considered an emergency which would require implementation of the emergency spillage response plan. Such emergencies are outside the scope of this ESIA.

Increased surface runoff is still likely despite the mitigation options, due to the increased impermeable area that will, in some cases, will be unavoidable.

To best avoid contamination or pollution incidents of surface water and groundwater, a comprehensive waste management plan and a sewage treatment plan will be undertaken prior to the main construction phase. On Scheme completion, the main contractor will have to carry out a site clean-up, including removal of all waste material including scrap metal.

Table 15.7: Residual impacts and effects noise and vibration impacts after application of mitigation

Receptor	Summary of Impact	Adverse/ Beneficial	Temporary/ Permanent	Impact Magnitude	Receptor Sensitivity	Effect Evaluation	Significance of Effect
Construction Phase							
Surface waters and groundwater	Spillages and leaks from the storage and handling of hazardous materials, such as bitumen, lubricants and fluids (e.g. engine oils, grease, brake fluids, etc), fuels, detergents, paints,	Adverse	Permanent	Negligible	High	Negligible	Not Significant
Surface waters and groundwater	Improper disposal practices or spillages and leaks of solid waste, sewage and hazardous waste.	Adverse	Permanent	Negligible	High	Negligible	Not Significant
Surface waters and groundwater	Runoff of hazardous or poisonous substances from the cleaning of vehicles, machinery and equipment in and near to River Namanve, swamps, streams and wetlands.	Adverse	Permanent	Negligible	High	Negligible	Not Significant
Surface waters and groundwater	Road and industry traffic, leading to spills and leakages during operation, refuelling and loading/unloading.	Adverse	Permanent	Negligible	High	Negligible	Not Significant
Surface waters	Dust creation and settlement leading to high suspended solid loads within water runoffs and into the River Namanve, swamps, streams and wetlands leading to siltation.	Adverse	Permanent	Minor	High	Moderate	Significant
Surface waters	Increased surface runoff and erosion of topsoil due to the lack of permeable areas	Adverse	Permanent	Major	Medium	Major	Significant
Operational Phase							
Surface waters	Increased surface runoff due to an increase in impermeable areas including as industry building roofs, paved/concreted areas, or compacted soils, and the loss of vegetation, permeable areas.	Adverse	Permanent	Minor	Medium	Minor	Not Significant
Surface waters and groundwater	Improper disposal practices or spillages and leaks of solid waste, sewage and hazardous waste.	Adverse	Permanent	Negligible	High	Negligible	Not Significant
Surface waters and groundwater	Spillages, leakages and surface runoff of hazardous and poisonous substances from a wide range of industrial practices. Pollutant sources include bitumen, lubricants (oil and grease), and fluids (e.g. engine oils, grease, brake fluids, etc), fuels, detergents, paints.	Adverse	Permanent	Negligible	High	Negligible	Not Significant
Surface waters	Increased surface runoff and erosion of topsoil due to the lack of permeable areas	Adverse	Permanent	Major	Medium	Major	Significant

16. Cumulative Effects

16.1 Overview

This chapter assesses cumulative effects of inter-project impacts of the assessed Scheme with other nearby schemes which are likely to exist in the future. A cumulative assessment considers effects in cumulation with existing or future significant development schemes, or natural process on receptors and resources over time which is additive or interactive in nature.

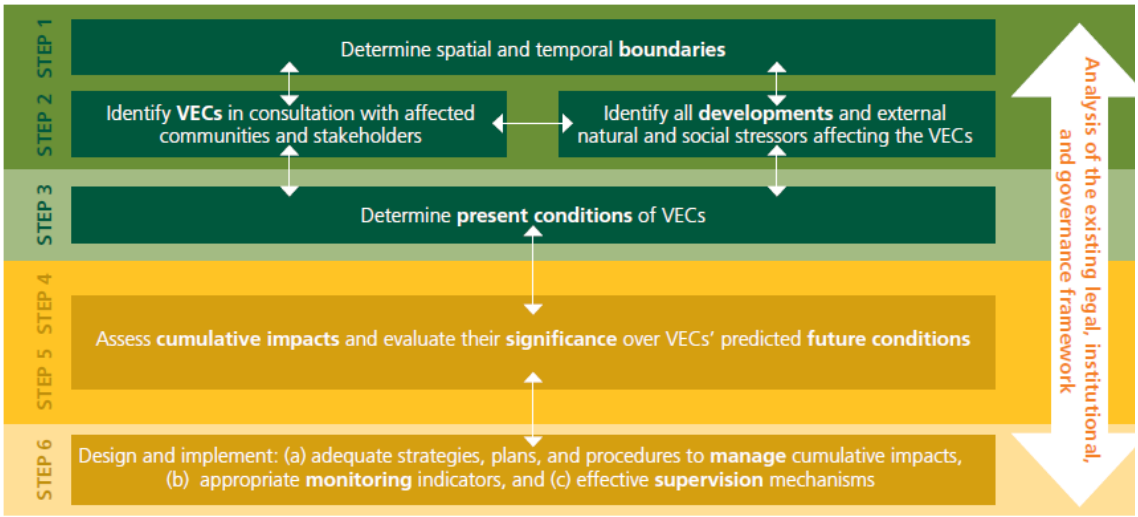
16.2 Method

The assessment methodology used in this chapter is adapted from the Rapid Cumulative Impact Assessment (RCIA) approach outlined in IFC's Good Practice Handbook: Cumulative Impact Assessment and Management, 2013. One of the key principles of cumulative impact assessment using this approach is to focus on Valued E&S Components (VECs), both for setting context of temporal and spatial boundaries to be considered and in assessing the significance of cumulative impacts.

The IFC good practice handbook outlines the following six steps to undertaking RCIA:

- Determine spatial and temporal boundaries;
- Identify VECs in consultation with effected communities and stakeholders;
- Identify all developments affecting VECs;
- Determine present condition of VECs;
- Assess cumulative impacts and evaluate their significance over predicted future conditions; and
- Design and implement (a) adequate strategies, plans, and procedures to manage cumulative impacts, (b) appropriate monitoring indicators, and (c) effective supervision mechanisms.

Figure 16.1: RCIA six step approach



Source: IFC, 2013

VECs refer to sensitive or valued receptors of combined or cumulative impacts. In this chapter, VECs have been identified based on assessments undertaken in each of the specialist sections within the ESIA, drawing on identification of critical receptors.

The assessment of cumulative effects is not intended to provide a detailed assessment of the effects of future developments; it has been undertaken at a high-level in the context of broad development parameters sufficient to provide an understanding of the likely cumulative environmental and social effects. Other schemes are limited in nature and relevant information is not always readily available, which prevents a more detailed assessment being undertaken.

The study area for the consideration of cumulative impacts incorporates the AoIs defined by each topic but is expanded to take into account the other schemes which are considered below. The temporal scale of the assessment is the construction duration and subsequent operational lifetime of the Scheme.

16.2.1 Assumptions and Limitations

For the purposes of this assessment, it has been assumed that all three additional schemes are developed at similar timeframes to the Scheme. Exact construction and operational timeframes are not known, therefore this assumption has been made to represent a worst-case scenario, and the conclusions of the assessment may be conservative on this basis.

Information on some of the other schemes has been limited, therefore detailed assessments on cumulative effects have not been possible. Again, a conservative approach has been taken to consider a worst-case scenario.

16.3 Baseline

16.3.1 Existing Projects

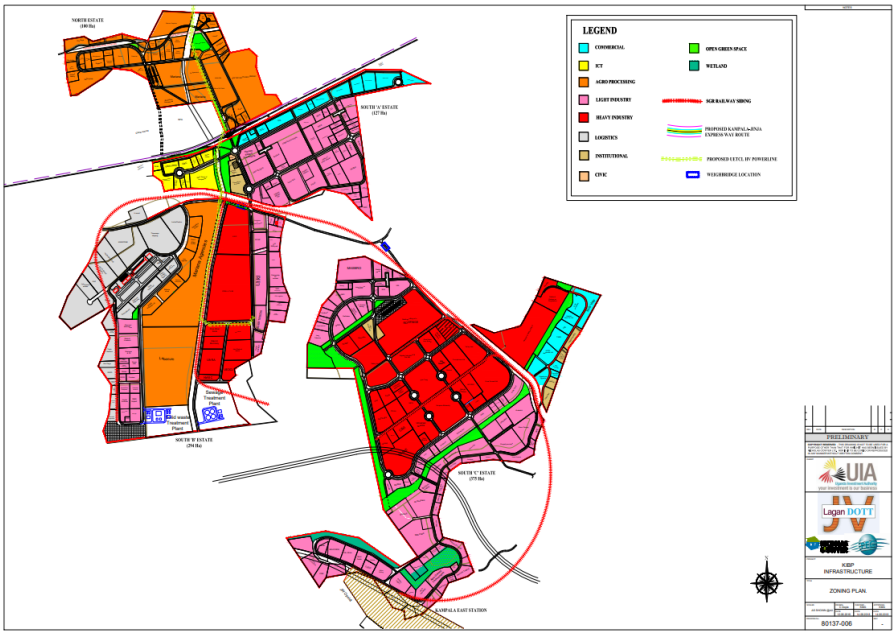
A search has been undertaken in consultation with NEMA and UIA to identify local projects that could have the potential to result in cumulative effects with the Scheme, based upon their location and scale.

There are three known significant existing projects in the area of the KIBP that are proposed or under development:

- Kampala – Jinja Expressway;
- Standard Gauge Railway; and
- Bukasa Port.

It is understood that all these schemes are at the design development stage, with construction works not yet commenced.

Figure 16.2: KIBP Layout, showing the Kampala – Jinja Expressway and the Standard Gauge Railway in relation to the Scheme



Source: Lagan-Dott JV, 2019

16.3.1.1 Kampala – Jinja Expressway

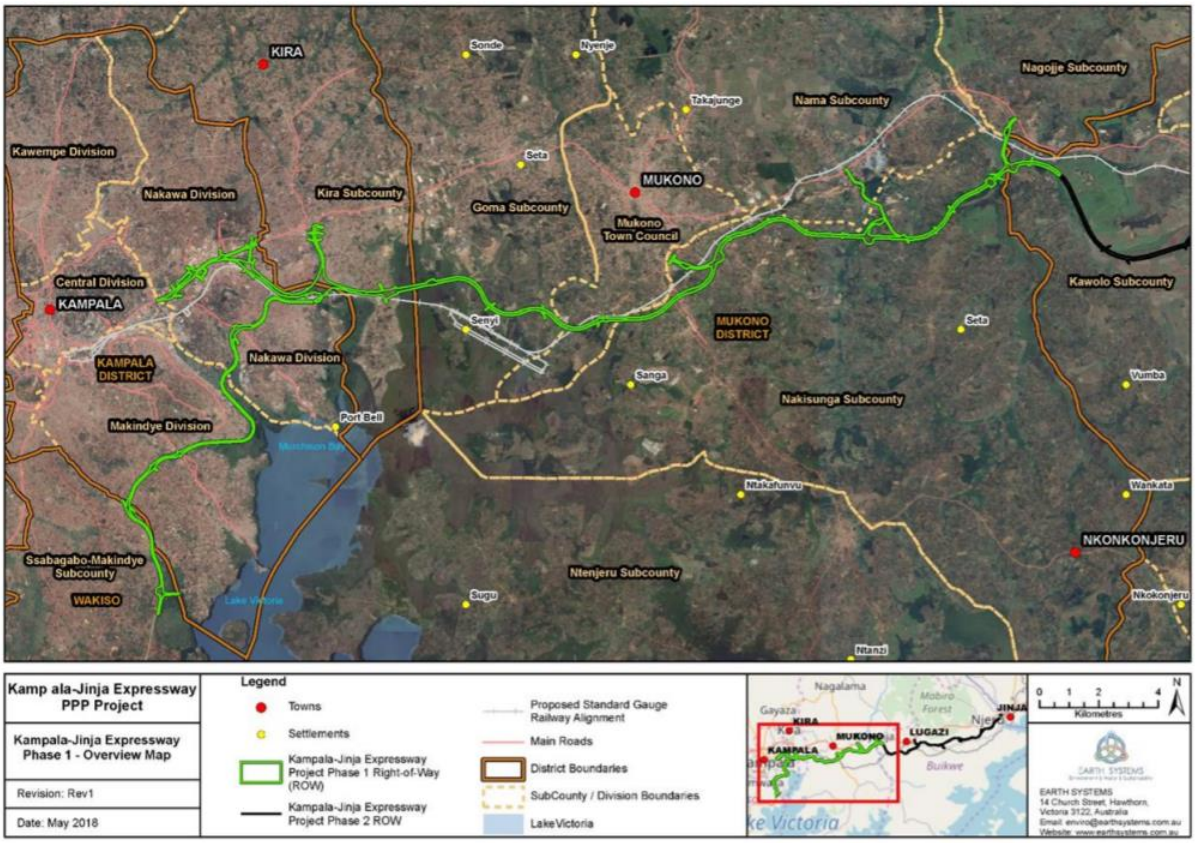
The Kampala – Jinja Expressway is part of the northern trade strategic corridor from Mombasa in Kenya through to Kigali in Rwanda serving as a trade link to the sea for land-linked countries of Uganda, Rwanda, South Sudan, and eastern Democratic Republic of Congo. It comprises the Kampala Jinja Expressway Mainline from the capital city of Kampala to the town of Jinja in the east of the Kampala Southern Bypass, broken into two phases: phase 1 consists of developing the expressway from Kampala to Namagunga and the Kampala Southern Bypass, both of which are expected to be completed by 2023. This is proposed to be constructed adjacent to the KIBP's southern boundaries.

Phase 2 consists of developing the expressway from Namagunga to Jinja which is expected to be completed by 2030. Phase 2 is located approximately 25km from the Scheme area, and, as such, has not been considered as part of the cumulative assessment.

Based on current alignment information, the expressway is proposed to be cross the southern part of the KIBP.

It is understood at the time of writing that the scheme is entering the design and build phase, starting with appointment of a contractor.

Figure 16.3: Route alignment of the Kampala – Jinja Expressway



Source: Earth Systems and Atacama Consulting, 2018 (Kampala – Jinja Expressway ESIA)

16.3.1.2 Standard Gauge Railway

The Standard Gauge Railway is proposed to be a regional project that will link partner states of Kenya, Rwanda and South Sudan. This will provide an improved transport mechanism within the region, and linking in with ports in Kenya, in order to help transport goods into and out of Uganda. The total route length of the project in Uganda is approximately 1720km. The first phase will be delivered between Malaba and Kampala, which is approximately 270km, and would intersect the southern area of the KIBP. There is limited publicly-available information as to the proposed route alignment of this scheme.

It is understood that at the time of writing, financing had not yet been secured for construction and therefore implementation timescales are unknown.

16.3.1.3 Bukasa Port

Bukasa Port is a planned inland port located along the northern shores of Lake Victoria, approximately 16km southeast of the central business district of Kampala. The port is expected to take up 465ha of land (Daily Monitor, 2019[87]), stretching into a wetland area managed by NEMA, a forest reserve managed by National Forest Authority and on some privately-owned

[87] Daily Monitor (2019) NEMA okays Kampala port construction. Available at: https://www.monitor.co.ug/News/National/Nema-okays-Kampala-port-construction/688334-4997752-opjkdu/index.html (last accessed 06/06/2019).

land (Daily Monitor, 2013[88]). The construction of the port will require dredging which is estimated to be one million cubic meters (Daily Monitor, 2019[87]). When completed, the inland port is expected to handle up to 5.2 million tonnes of freight annually. The port will facilitate the movement of goods from the Tanzanian ports thus reducing Uganda's high level of dependence on the port of Mombasa, Kenya (Daily Monitor, 2013). At the time of writing, it is understood the construction of associated infrastructure (such as access roads) is already underway.

Figure 16.4: The three considered cumulative schemes in relation to the KIBP

Source: Gauff Engineering, 2017

Blue denotes the Kampala – Jinja Expressway
Green denotes the Standard Gauge Railway
Red denotes the Bukasa Port to the south, and its access routes

16.3.2 Potential Future Projects

Following consultation with NEMA, other future projects, in addition to those identified above, have not been noted. Therefore, no other projects are considered as part of the cumulative assessment, and the only three aforementioned projects are assessed against the Scheme.

16.4 Assessment of Combined and Cumulative Effects

16.4.1 Identification of Valued Environmental and Social Components

Key VECs in this ESIA are identified as:

- Air quality and noise;

[88] Daily Monitor (2013) Bukasa inland port survey scheduled for next month. Available at: https://www.monitor.co.ug/Business/Prosper/Bukasa-inland-port-survey-scheduled-for-next-month/688616-1704142-item-00-na68s1z/index.html (last accessed 06/06/2019).

- Visual amenity;
- The Forest Reserve;
- Lake Victoria and wetland swamps;
- River Namanve;
- Other surface waters;
- Groundwater;
- Flora and fauna;
- Users of external roads adjacent to the KIBP;
- Users of internal KIBP road networks;
- Informal land users of the KIBP site;
- Local communities and livelihoods;
- Scheme workers; and
- Local and regional businesses.

16.4.2 Mitigation

The assessments on a topic by topic basis in this ESIA consider mitigation which is to be incorporated into the Scheme before then undertaking an assessment of residual effects.

This cumulative assessment is also on the basis of incorporated mitigation, and therefore all mitigation identified in the assessments are included in this assessment.

16.4.3 Assessment of Cumulative Effects

The construction programmes of the cumulative schemes are not fully known. Therefore, a worst-case scenario of construction programmes with the Scheme are assumed. This worst-case scenario cumulative assessment for construction is presented in Table 16.1.

Table 16.1: Predicted cumulative effects - construction

VEC	Impact	Cumulative Effects
Air quality and noise	Construction nuisance on adjacent residential and community receptors due to construction activities and construction traffic.	Construction activities and plant on site for all four schemes have the potential to worsen air quality (such as through dust or emissions) and noise (such as through noisy pant or activities, including piling). Construction mitigation will minimise disruption, with best site practice reducing dust and construction noise for local receptors. Further construction impacts are predicted to be as a result of construction traffic for all schemes. Whilst details on the construction routes proposed for the other three schemes are not known, given the close location of all assessed schemes, it is considered to be likely that they will use the same or similar routes, affecting the same receptors. Following implementation of mitigation, if is considered that there is potential for a **Moderate Adverse Cumulative Effect** which is **Significant.**
Visual amenity	Construction disruption to adjacent residential and community receptors through visual intrusion arising from the construction works, such as use of tall plant.	Construction plant and activities will be introduced to the area, with the landscape changing as the schemes are constructed through the introduction of new infrastructure. Parts of the local area are already urbanised, or adjacent to urban areas, and so construction plant and activities are less likely to distract from the baseline in these areas. However, in the more rural areas, construction plant and activities will result in a reduction in tranquillity and increased humanisation of a natural habitat (such as in the wetland areas). Overall, it is considered that there is potential for a **Moderate Adverse Cumulative Effect** which is **Significant.**

VEC	Impact	Cumulative Effects
The Forest Reserve	Habitat loss of approximately 0.95km^2 within the Forest Reserve. Habitat degradation within 500m of the Scheme site Spread of alien invasive species	It is understood that the Kampala – Jinja Expressway will also result in habitat loss at the Namanve Forest Reserve. These two schemes therefore would together result in an increase loss of forest habitat. Whilst offsetting would provide mitigation, this won't have matured during the construction phase. It is not known if the other cumulative schemes would have direct impacts upon the reserve, however the Standard Gauge Railway appears to follow the alignment of the existing narrow-gauge railway, and the port does not appear to introduce new infrastructure to this area, therefore it is concluded that these will not directly affect the Forest Reserve, subject to further information. Overall, it is considered that there is potential for a **Moderate Adverse Cumulative Effect** which is **Significant**.
Lake Victoria and wetland swamps	Pollution from spillages or leaks Spread of Alien Invasive Species Habitat loss, degradation and fragmentation. Siltation from construction activities	There is potential for all schemes to result in impacts to Lake Victoria from construction works with surface and groundwater transporting effluents etc downstream, although appropriate construction practices would minimise these. However, development of the Bukasa Port in particular has potential to affect Lake Victoria directly as it is proposing for works to take place within it, resulting in habitat degradation upon a sensitive receptor. Whilst the other schemes wouldn't directly impact Lake Victoria, runoff into surface water or groundwater could enter the lake, which would act in cumulation with the construction of Bukasa Port. Overall, it is considered that, through implementation of best practice, there is potential for a **Minor Adverse Cumulative Effect** which is **Not Significant**.
River Namanve	Pollution from spillages or leaks Spread of Alien Invasive Species Siltation from construction activities Higher levels of runoff due to increase in paved surface area	Three of the schemes would interact with the River Namanve by being located adjacent to it (this Scheme) or by crossing it (the Kampala – Jinja Expressway and Standard Gauge Railway). Whilst implementation of good site practice should minimise the potential for substances to enter the water course (e.g. use of oil traps), there remains a residual risk for construction activities to cause siltation (such as through soil compaction or dust emissions). These schemes will cause an increase in hardstanding which can result in higher rates of runoff into the river. Overall it is considered, through the implementation of best practice, that there is potential for a **Minor Adverse Cumulative Effect** which is **Not Significant.**
Other surface waters	Pollution from spillages or leaks Siltation from construction activities Higher levels of runoff due to increase in paved surface area	All the considered schemes have the potential to interact with other surface water bodies, such as streams and ponds. Whilst implementation of good site practice should minimise the potential for substances to enter the water course (e.g. use of oil traps), there remains a residual risk for construction activities to cause siltation (such as through soil compaction or dust emissions). These schemes will cause an increase in hardstanding which can result in higher rates of runoff into water bodies. Overall it is considered that, through the implementation of best practice, there is potential for a **Minor Adverse Cumulative Effect** which is **Not Significant.**
Groundwater	Pollution from spillages or leaks	Protective measures through good site practice should minimise the potential for groundwater disturbance through spillages and leaks. Therefore, it is considered that there is potential for a **Minor Adverse Cumulative Effect** which is **Not Significant.**
Flora and fauna	Loss, fragmentation or degradation of habitat resulting in reduced biodiversity. Disturbance from human activities (e.g. noise, artificial light, vibration, vehicle movement) Hunting and poaching of wildlife due to improved access roads Injury or death	All four schemes have the potential to cause impacts upon the flora and fauna in the vicinity of the KIBP. Construction works have the potential to result in direct impacts through direct interaction with fauna and flora, and indirect impacts through habitat degradation. The increase in human interaction with the area means that flora and fauna are likely to have greater levels of disturbance, such as through lighting for construction works, higher risk of death through conflicts with construction vehicles and plant, and risk of hunting or poaching. It is assumed that control plans will be in place to help mitigate all four schemes. Overall, this is considered to be a **Moderate Adverse Cumulative Effect** which is **Significant.**

VEC	Impact	Cumulative Effects
	Increase in road kills and injuries Pollution from effluents Siltation and increased risk of flooding Spread of Alien Invasive Species	
Users of external roads adjacent to the KIBP	Increased congestion due to construction traffic Increased risk of conflict between pedestrians, cyclists, and livestock and heavy goods vehicles Wear and tear	It is likely that construction vehicles for the respective schemes will use similar access routes for works in the vicinity of the KIBP. This will increase the risk of accidents between vehicles, or between vehicles and pedestrians, cyclists and livestock. This will also contribute to increased congestion on these roads, increasing travel time. Wear and tear of the roads is likely to increase, which has the potential to be a safety risk for drivers, especially given that many roads will only become paved during the construction phase. Overall, this is considered to be a **Moderate Adverse Cumulative Effect** which is **Significant.**
Users of internal KIBP road networks	Increased congestion due to temporary works to highways and associated traffic management Increased risk of conflict between pedestrians, cyclists, and livestock and larger construction vehicles and plant	The KIBP's internal road network will be upgraded as part of the Scheme, which is likely to cause some small-scale disruption. However, the other schemes considered in this cumulative assessment are unlikely to use these roads for their construction works, instead mostly using external roads to the KIBP. Therefore, overall this is considered to be a **Negligible Cumulative Effect** which is **Not Significant.**
Informal land users of the KIBP site	Loss of ecosystem services Severance Economic displacement	The Scheme would enable the development of the KIBP which would see the development of plots of land that are currently for informal uses developed or for ecosystem services. The other schemes are less likely to have such a large impact in the vicinity of the KIBP as they either linear in nature (Kampala – Jinja Expressway and Standard Gauge Railway) or are located in an area with a lower level of informal use (Bukasa Port). It is assumed a Livelihood Restoration Plan will be produced for all schemes to help provide mitigation for informal land users. Overall, this is considered to be a **Minor Adverse Cumulative Effect** which is **Not Significant.**
Local communities and livelihoods	Loss of access to ecosystem services Severance Employment opportunity Inward migration Severance and conflicts with traffic from construction works Community frustrations due to missed expectations	All schemes being constructed simultaneously could put strain on local communities with greater numbers of people migrating to the area due to the large range of construction job opportunities and construction traffic impacts from all four schemes affecting access and creating a safety concern for communities. Communities may be consulted on all schemes and their expectations may be raised in line with their understanding of the opportunities – if these expectations are missed then this can create tension between communities and Scheme sponsors. However, beneficial effects resulting from employment opportunities from the construction of the schemes, as well as increased local spending, will counter-act adverse impacts felt. Overall this is considered to be a **Minor Adverse Cumulative Effect** which is **Not Significant.**
Scheme workers	Labour and occupational health and safety risks	It is assumed that appropriate health and safety standards will be implemented on these sites, minimising the risks to workers. Overall this is considered to be a **Negligible Cumulative Effect** which is **Not Significant.**
Local and regional businesses	Increased revenue for local business due to increase in employment opportunities associated with the construction works	There are predicted to be opportunities for local businesses to increase in revenue and size in order to supply the construction operations and staff working on the four considered schemes. Overall, this is considered to be a **Minor Beneficial Cumulative Effect** which is **Not Significant.**

An assessment of the cumulative operational impacts on the VECs is presented in Table 16.2.

Table 16.2: Predicted cumulative impacts - operation

VEC	Impact	Cumulative Impact
Air quality and noise	Noise and air pollution resulting from increased traffic levels to serve the businesses operating in the KIBP	The Kampala – Jinja Expressway is anticipated to reduce air and noise pollution along existing routes as vehicles would instead use the new road. However, in areas where there is currently no highway, both of these would worsen. The Standard Gauge Railway would help reduce freight traffic on the roads, helping to reduce air and noise pollution from road vehicles, although pollution arising from the operation of trains is unknown and is likely to be adverse. The operation of the Bukasa Port is not considered likely to result in direct impacts upon air quality and noise due to the distance between schemes, however traffic routes to access the port are not known and could contribute to air and noise pollution locally to the KIBP. Overall, this is considered to be a **Minor Adverse Cumulative Effect** which is **Not Significant.**
Visual amenity	Permanent infrastructure changing the landscape	The visual amenity of the area will be affected by the change towards a fully-developed KIBP, with surrounding new infrastructure such as the standard gauge railway and Kampala – Jinja Expressway which will make the vicinity around KIBP are more urbanised landscape than at present. Whilst most of these features won't affect the wider landscape as they are flat, there will be a new flyover introduced. An increase in traffic, particularly good vehicles serving the KIBP and passing vehicles on the Kampala – Jinja Expressway and towards the Bukasa Port will affect the tranquillity of the area, although it is envisaged that would help reduce vehicle usage along existing routes. Overall, this is considered to be a **Moderate Adverse Cumulative Effect** which is **Significant.**
The Forest Reserve	Habitat degradation within 500m of the Scheme site Spread of alien invasive species	It is understood that the KIBP infrastructure scheme and the Kampala – Jinja Expressway will result in permanent habitat loss at the Namanve Forest Reserve. Whilst offsetting would mitigate this, it would take time for the offset area to mature and there would still be a likely large negative cumulative impact to the reserve. It is assumed that the other two schemes would not result in direct impacts upon the forest, although they may open up pathways for the spread of invasive species. Overall, it is considered that there is potential for a **Moderate Adverse Cumulative Effect** which is **Significant**.
Lake Victoria and wetland swamps	Spread of Alien Invasive Species Habitat degradation Pollution from spillages or leaks Habitat fragmentation Spread of alien invasive species	Appropriate management measures for the operation of individual developments in the KIBP would minimise the potential for pollution events to take place which could move downstream to Lake Victoria and associated wetlands. It is also assumed that the other schemes would have measures in place to minimise the potential for spillages to enter surface water bodies, such as oil traps. However, the opening up of new linear routes (i.e. the Kampala – Jinja Expressway and Standard Gauge Railway) may create new pathways for invasive species to access Lake Victoria and its associated wetlands, including those that may be brought in accidentally though the Bukasa Port. Together, these schemes will result in habitat fragmentation, although biodiversity offsetting will mitigate for this. Overall, it is considered that there is potential for a **Minor Adverse Cumulative Effect** which is **Not Significant.**
River Namanve	Siltation and increased risk of flooding Spread of alien invasive species Higher levels of surface runoff due to increase in paved surfaces or compacted soils	Appropriate management measures for the operation of the KIBP would minimise the potential for pollution events to take place (such as oil traps for road drainage). It is also assumed that the other schemes would have measures in place to minimise the potential for spillages to enter surface water bodies, such as oil traps. However, the opening up of new linear routes (i.e. the Kampala – Jinja Expressway and Standard Gauge Railway) may create new pathways for invasive species to access the River Namanve, and the Bukasa Port may be a point of arrival for additional invasive species. The increase in hardstanding as a result of all schemes, as well as soil compaction, will lead to greater levels of runoff, and can make the river more liable to flood and result in increased siltation. Mitigation, such as use of permeable surfaces where practicable, will help reduce these effects. Overall, it is considered that there is potential for a **Minor Adverse Cumulative Effect** which is **Not Significant.**
Other surface waters	Higher levels of surface runoff due to increase in paved	Appropriate management measures for the operation of the KIBP would minimise the potential for pollution events to take place (such as oil traps for road drainage). It is also assumed that the other schemes would have measures in place to

VEC	Impact	Cumulative Impact
	surfaces or compacted soils Spillages and leaks of polluting substances due to improper disposal and management practices	minimise the potential for spillages to enter surface water bodies, such as oil traps. With the implementation of these, larger-scale spills would be considered an emergency issue, and require use of the Emergency Response Plan, and this is outside the scope of this ESIA. The increase in hardstanding as a result of all schemes, as well as soil compaction, will lead to greater levels of runoff and can result in increased siltation. Mitigation, such as use of permeable surfaces where practicable, will help reduce these effects. Overall, it is considered that there is potential for a **Minor Adverse Cumulative Effect** which is **Not Significant.**
Groundwater	Spillages and leaks of polluting substances due to improper disposal and management practices	Appropriate management measures for the operation of the KIBP would minimise the potential for pollution events to take place (such as oil traps for road drainage). It is also assumed that the other schemes would have measures in place to minimise the potential for spillages to enter surface water bodies, such as oil traps. Overall, it is considered that there is potential for a **Minor Adverse Cumulative Effect** which is **Not Significant.**
Flora and fauna	Habitat degradation Hunting and poaching of wildlife due to improved access roads Disturbance from human activities (e.g. noise, artificial light, vibration, vehicle movement) Injury or death Increase in road kills and injuries Pollution from effluents Siltation and increased risk of flooding	All four schemes have the potential to cause impacts upon the flora and fauna in the vicinity of the KIBP. The reduction in quality and quantity of habitats through permanent land take for development will reduce the biodiversity potential of the area. Any offsetting would take time to mature to be suitable. The schemes would also bring humans into increased contact with the flora and fauna, resulting in increased risks of mortality through hunting or road kill (or by rail), and increased disturbance through the operations of the schemes, with the area becoming increasingly urbanised. Overall, this is considered to be a **Moderate Adverse Cumulative Effect** which is **Significant.**
Users of external roads adjacent to the KIBP	Increased congestion due to vehicles accessing the operational KIBP Increased risk of conflict between pedestrians, cyclists, and livestock and heavy goods vehicles Wear and tear of roads	The Kampala – Jinja Expressway is anticipated to reduce congestion on local roads, therefore it would help to counter-act increases in traffic volumes anticipated as part of the operation of the KIBP and the Bukasa Port. The Standard Gauge Railway would help reduce freight traffic on the roads, again counter-acting increases in road traffic as part of the operation of the KIBP. It is proposed that the Standard Gauge Railway would link into the Bukasa Port, which would also help reduce road traffic flows accesing the port through the vicinity of the KIBP. Traffic routes to access Bukasa Port are not known; this may result in an increase in vehicles on the roads around the KIBP. Overall, this is considered to be a **Negligible/Slight Beneficial Cumulative Effect** which is **Not Significant.**
Users of the internal KIBP road networks	Increased risk of conflict between pedestrians, cyclists, and livestock and heavy goods vehicles Wear and tear of roads	It is unlikely that significant volumes of road traffic arsing from other the schemes would be using the internal road network within the KIBP. Those that would be accessing the businesses within the KIBP from e.g. the Bukasa Port would already be incorporated into the traffic calculations for the Scheme). On this basis, this is considered to be a **Negligible Cumulative Effect** which is **Not Significant.**
Informal land users of KIBP the site	Loss of ecosystem services Severance Economic displacement	The Scheme would enable the development of the KIBP which would see plots of land developed that are currently used for ecosystem services or informal uses. The other schemes are less likely to have such a large impact in the vicinity of the KIBP as they are either linear in nature (Kampala – Jinja Expressway and Standard Gauge Railway) or are located in an area with a lower level of informal use (Bukasa Port). It is assumed a Livelihood Restoration Plan will be produced for all cumulative schemes to help provide mitigation for informal land users. Overall, this is considered to be a **Minor Adverse Cumulative Effect** which is **Not Significant.**
Local communities and livelihoods	Direct employment generation Improved road access,	It is considered that there is limited potential for there to be significant job creation locally in addition to the KIBP as a result of the operational phase of the Kampala – Jinja Expressway or the Standard Gauge Railway.

VEC	Impact	Cumulative Impact
		The Bukasa Port is likely to result in significant employment provision during its operational phase, although the estimated numbers are not known. Without further information, a more detailed conclusion cannot be reached, however there is potential for communities around the KIBP to be a source of employment for both the KIBP and Bukasa Port which would result in beneficial impacts through improved economic opportunities for these communities, but also encourage inward migration which can have adverse impacts. The improved transportation infrastructure that the four schemes bring the area will enable improved access to and from local communities, although this is counter-acted by increased potential for conflicts with vehicles with increased traffic. Overall, based on available information, this is considered to be a **Negligible Cumulative Effect** which is **Not Significant.**
Local and regional businesses	Increased revenue for local and regional businesses and governments	As above, based on the limited knowledge of some of the other schemes, there is considered to be a low potential for the operation of the other three schemes to result increased job provision available for the area around the KIBP. Therefore, based on available information, this is considered to be a **Negligible Cumulative Effect** which is **Not Significant.**

16.5 Recommendations for Addressing Cumulative Effects

The cumulative assessment identified recommendations to be taken forwards to minimise the effects from the development of this Scheme at the same time as other large schemes in the vicinity. These other schemes were identified as:

- Kampala – Jinja Expressway;
- Standard Gauge Railway; and
- Bukasa Port.

Good inter-project communication between developers will be key to manage cumulative impacts which result from construction and operational impacts. A flexible approach to managing cumulative effects will be required, given the uncertainties associated with potential other schemes in the area.

The key recommendations are:

- Coordinated approach between potential schemes regarding the employment of local populations and the upskilling of workers if these potential schemes are to be executed concurrently;
- Coordinated traffic management plans and community health and safety plans to take account of local populations schedules, project construction and operational schedules;
- Implementation of best practice visual mitigation measures during construction, particularly near sensitive receptors where cumulative effects could occur;
- Effective line of communication between developers and contractors to ensure that grievances can be shared between schemes and (collective) action taken where necessary;
- Effective communication between developers to understand and coordinate the mitigation measures and management strategies being applied to minimise impacts on aquatic and terrestrial biodiversity;
- A coordinated analysis of cascade failure should be undertaken to assess potential impacts that a cascade failure may have;
- A coordinated monitoring programme for key environmental VECs, such as for air quality, noise, water quality, or biodiversity, and sharing of results so that appropriate actions can be coordinated between schemes; and

- A coordinated consultation programme with key environmental stakeholders, such as concerning the impacts to the Forest Reserve and River Namanve, to ensure any management measures or offsetting can be coordinated.

17. Information Disclosure and Consultation

17.1 Overview

This chapter described the information disclosure, consultation and participation activities that have been undertaken as part of the ESIA process in accordance with the Stakeholder Engagement Plan (SEP), included in Volume IV. The SEP was produced at the outset of the ESIA process and will be a live document which Sponsor will update throughout the Scheme's lifecycle.

17.2 Stakeholder Engagement Plan (SEP)

The SEP was first developed at the outset of the ESIA process to guide stakeholder engagement and public consultation activities throughout the ESIA process, and throughout the construction and operation of the Scheme. It has then been updated through the completion of the ESIA as the understanding of stakeholders needs increased.

The SEP is a strategic document used to plan a comprehensive and culturally appropriate approach to consultation and disclosure. It is underpinned by the principles that community engagement should be free of external manipulation, interference, coercion and intimidation, and conducted on the basis of timely, relevant, understandable and accessible information, in a culturally appropriate manner. Consultation is to be well planned and based on principles of respectful and meaningful dialogue. All consultation activities will be planned to facilitate the active participation of women, elderly and disabled members in public meetings.

The SEP will remain a live document throughout the life of the Scheme and will be regularly reviewed throughout the course of the ESIA process, as well as during the construction and operation phases.

17.3 Stakeholder Consultation Objectives

Public consultation and disclosure are a cornerstone of the approach to the planning and implementation of large infrastructure projects such as this one. Effective dialogue and exchange amongst the full range of stakeholders is a critical element to the success of the ESIA and Scheme planning processes, and the subsequent realisation of Scheme objectives. Stakeholder engagement will be used as a tool for two-way communication between the UIA (including its project managers/team, consultants and contractors) and the public. The UIA and ESIA Consultant are committed to active and ongoing communication with all affected communities, organisations, groups and individuals with an interest in the Scheme.

17.4 ESIA Stakeholder Engagement Activities

17.4.1 Overview

Prior to this ESIA stakeholder engagement activities were previously conducted as part of the 2002 and 2008 ESIA studies, as further detailed in the SEP. As part of these consultations, views of various national and district ministries and departments on the potential Scheme impacts were obtained, relating to land required, pollution, and employment opportunities for local communities.

This section presents the consultation activities undertaken during the 2019 ESIA process and their outcomes, and summarises activities planned throughout the remainder of the Scheme's

lifecycle in accordance with the SEP. These activities are presented in chronological order in the subsections below, namely:

- Stage 1: Scoping consultation and disclosure;
- Stage 2: Main ESIA consultation and disclosure;
- Stage 3: Draft ESIA Report consultation and disclosure; and
- Further stakeholder engagement planned throughout the lifetime of the Scheme.

17.4.2 Stage 1: Scoping consultation and disclosure

The scoping phase consultation activities were undertaken from 2 to 4 April 2019 as shown below, with governmental authorities at various levels, village representatives and an NGO. These activities consisted of key private informant interviews to introduce the Scheme scope, obtain views on potential Scheme impacts and key concerns, and explain the ESIA process including the scoping report to be developed that would take into consideration the stakeholders' views, and the public consultations to be held on the scoping outcomes.

Table 17.1: Scoping phase stakeholder engagement activities

Date	Interested and affected stakeholders	Issues raised by stakeholders	Section of ESIA where addressed
2 April 2019	Mukono District officials	Introduction to Scheme and discussion of key concerns about potential impacts, including importance of greenery and leisure spaces, local employment and content, noise and air pollution, drainage and stormwater systems	Chapter 12, 11, 5, 15
3 April 2019	Ministry of Water and Environment Directorate of Water Resources officials	Lake Victoria water levels at Entebbe and potential impacts of Scheme on regional hydrological aspects	Chapter 15
3 April 2019	Uganda National Meteorology Authority (UNMA) officials	Historic rainfall data in the vicinity of Namanve and management of hydrological impacts of Scheme	Chapter 15
3 April 2019	Wakiso District officials	Introduction to Scheme and discussion of key concerns about potential impacts, including upskilling of local candidates, local content, influx of workers and resulting adverse impact on local infrastructure and women through gender-based violence and spread of STDs, greenery, dust impacts of heavy traffic on roads	Chapters 5, 10, 12, 13
3 April 2019	Kira Municipal Council officials	Introduction to Scheme and discussion of key concerns about potential impacts, including risk of poor OHS and labour management practices, recruitment of locals for technical roles and upskilling of local employees, congestion and pollution on roads, and encroaching of construction activities on neighbouring land plots.	Chapters 10, 12, **Error! Reference source not found.**
3 April 2019	Mukono Municipal Council officials	Introduction to Scheme and discussion of key concerns about potential impacts. Key issues brought up by officials include importance of preservation of green spaces in the site, joint collaboration between the UIA and local authorities and harmonisation of the Scheme with municipal development plans, social investments needed in the local communities such as hospitals and churches, improvement of roads, and a detailed hydrology study to be conducted for a better drainage system.	Chapters 10, 13**Error! Reference source not found.**, 15
3 April 2019	Koolo Village Local Council members	Introduction to Scheme and the scoping public consultations that took place in mid-April 2019, which will disclose the outcomes of the scoping report and obtain stakeholders' views to be incorporated into the draft ESIA report. Village members will be encouraged to attend.	
3 April 2019	Degeya Village Local Council members	Introduction to Scheme and the scoping public consultations that took place in mid-April 2019, which will disclose the outcomes of the scoping report and obtain stakeholders' views to be incorporated into the draft ESIA report. Village members will be encouraged to attend.	

Date	Interested and affected stakeholders	Issues raised by stakeholders	Section of ESIA where addressed
3 April 2019	Kiwanga Village Local Council members	Introduction to Scheme and the scoping public consultations that took place in mid-April 2019, which will disclose the outcomes of the scoping report and obtain stakeholders' views to be incorporated into the draft ESIA report. Village members will be encouraged to attend.	
4 April 2019	Kireku Village Local Council members	Introduction to Scheme and the scoping public consultations that took place in mid-April 2019, which will disclose the outcomes of the scoping report and obtain stakeholders' views to be incorporated into the draft ESIA report. Village members will be encouraged to attend.	
4 April 2019	Kireku Village Local Council members	Introduction to Scheme and the scoping public consultations that took place in mid-April 2019, which will disclose the outcomes of the scoping report and obtain stakeholders' views to be incorporated into the draft ESIA report. Village members will be encouraged to attend.	
4 April 2019	Goma Division officials	Introduction to Scheme and discussion of key concerns about potential impacts, including need for community investment, impact of potential poor OHS and labour management practices, recruitment of women, adverse impacts of labour influx.	Chapter 12
4 April 2019	Bwoyogerere Division officials	Introduction to Scheme and discussion of key concerns about potential impacts, including need for greenery and leisure space, technical roles for locals, labour influx, traffic obstruction and pollution and water contamination.	Chapter 12, 13**Error! Reference source not found.**, 15
4 April 2019	Nature Uganda (NGO) Director - Programmes	Introduction to Scheme and discussion of key areas to explore in the ESIA baseline data collection phase, including maintenance of water streams and preservation of habitats.	Chapter 15, 6

17.4.3 Stage 2: Main ESIA Consultation and Disclosure

The main ESIA consultation activities took place from April to June 2019. These activities consisted of public meetings (Table 17.2) and key private informant interviews (Table 17.3) to disclose the scoping findings, and proposed terms of reference for the ESIA package to be developed based on the results of the scoping study. Meetings were also held to gather baseline and impact assessment data at village and household levels, and obtain views and concerns about Scheme impacts from affected and interested parties through private meetings and household surveys. Figure 17.1 and Figure 17.2 below show two of the consultations held.

Figure 17.1: Kazinga Main local council consultation

Source: Q&L

Figure 17.2: Degeya local council consultation

Source: Q&L

Information was provided at the meetings in response to attendants' concerns and queries about the Scheme impacts, including estimated timeframes for construction works, and mitigation measures to be implemented as part of the Scheme scope. These included the development of local recruitment targets and strategies, support for economically displaced individuals, community investment planning and traffic management to mitigate adverse impact on local pedestrians and motorists.

Table 17.2: Main ESIA stakeholder engagement activities – Public consultations

Date	Interested and affected stakeholders	Issues raised by stakeholders	Section of ESIA where addressed
16 April 2019	Namataba local council members	Public consultation on draft ESIA scoping report Key concerns raised included: • Noise and dust pollution need to be managed well for health of both workers and local communities • The Scheme should develop or improve public health facilities • Concerns about potential increase in crime levels due to influx of people from different regions of Uganda • Collaboration between the project developer, businesses and local community leaders is key • Accommodation should be provided for workers on site to reduce congestion • Waste management sites should be included in the Scheme design to minimise waste dumps in the open	Chapter 5, 11, 12, 14
16 April 2019	Kazinga Main local council members	Public consultation on draft ESIA scoping report Key concerns raised included: • Local candidates for Scheme employment should be vetted through the local councils. Jobs made available for local communities should be for both skilled and unskilled roles and not limited to casual jobs • Noise and dust pollution must be managed well, including regulation of generator noise • The area has recently experienced population growth; there are concerns that this will be exacerbated with influx of jobseekers. Separate health facilities for workers should be established to minimise strain on public health centres • Green spaces should be provided for local communities' use • The Scheme should facilitate involvement of youths in employment and recreational activities to improve living conditions and reduce crime • The local service taxes should be paid to the villages rather than the municipal or divisional authorities • Ongoing communication and disclosure of ESIA report with local leaders is key	Chapter 5, 11, 12, 14
16 April 2019	Kireku Main and Kireku Railway local council members	Public consultation on draft ESIA scoping report Comments received included: • Access roads need to be improved and traffic rerouted as there is heavy congestion • Access to spring wells in site should be maintained or alternatives provided • Security on site should be improved through better lighting • Site boundaries need to be clearly demarcated to ensure no encroachment on private land • Concerns around adequate sewerage and drainage management to avoid flooding, sanitation and hygiene risks • Hopes to see more tree planting and green space as the site was previously a forest reserve • Community investment is key such as recreation areas, supporting public facilities like schools and hospitals • Concerns regarding influx. Workers should be given accommodation on site to reduce congestions on local roads • Local content and employment is key, and not just casual labour roles. Roles for women and disabled people should be available. Buildings should be constructed with accessibility in consideration	Chapter 5, 11, 12, 13, 15

Date	Interested and affected stakeholders	Issues raised by stakeholders	Section of ESIA where addressed
17 April 2019	Koolo-Buwanyi and Nantabuliwa local council members	Public consultation on draft ESIA scoping report Comments received included: • Need for green space and tree planting in site and local areas • Concerns around drainage system that can manage flooding • Facilitation of access roads; traffic management is important to reduce congestion • Concerns regarding waste and sewage management • Need for KIBP to link with municipal development plans to coordinate and harmonise developments in the area including road, waste, water and sewage system management • Concerns about influx of jobseekers and risk of domestic violence and breakdown of family units due to unsocial shift work • Local job creation and content key • Community sensitisation on managing HIV/AIDS is important	Chapter 12, 13, 14, 15
17 April 2019	Degeya, Namilyango and Kitale local council members	Public consultation on draft ESIA scoping report Comments received included: • Local employment key • Provision of support for local communities such as maintenance and construction of community facilities • Pollution control is a concern. Reforestation is requested • Community access to spring well is key as they lack national water connection • Good labour practices are needed including clear written contracts for workers • The workforce needs to respect the local communities' cultures in their interactions	Chapter 12, 13, 15
18 April 2019	Kasokoso and Mawotto local council members	Public consultation on draft ESIA scoping report Comments received included: • Questions around the Scheme contact details for any queries or concerns • Existing roads should be improved and access roads created in neighbouring villages to improve access and reduce congestion • Local leaders need to be informed about finalised Scheme designs and boundaries • Public recreational area should be established in the park • A positive relationship between the Scheme and local communities are key, including transparent and regular communication about major developments	Chapter 12, 13
18 April 2019	Kiwanga Lwanda local council members	Public consultation on draft ESIA scoping report Comments received included: • Community investment initiatives like provision of electricity and piped water and improvements to public health facilities should be considered • Youths should be provided with variety of job opportunities, including unskilled and skilled roles • Concerns about dust and potential damaging impact on properties • Potential impact of Scheme -induced influx of jobseekers and impact on family structures should be addressed and mitigated • Women and people with disabilities should be considered in recruitment strategies • People conduct livestock grazing on site – how will they be impacted?	Chapter 5, 12
6 May 2019	Butto Village local council members	Public consultation on draft ESIA scoping report and views on potential Scheme impacts Key concerns received included: • Youth employment opportunities are key to reduce crime rates • Importance of maintenance of green space on site • Drainage system needs to be well managed • Compensation for land to be acquired for transmission line • Effective management of Scheme traffic and parking lots are key to minimise highway congestion	Chapter 12, 13, 15

Date	Interested and affected stakeholders	Issues raised by stakeholders	Section of ESIA where addressed
		• Good communication with local communities is needed concerning influx of jobseekers and potential impacts, including family breakdowns and domestic disputes • Importance of ongoing, continual communication with community leaders	

Source: Q&L and Mott MacDonald

Table 17.3: Main ESIA stakeholder engagement activities – Key informant meetings

Date	Interested and affected stakeholders	Issues raised by stakeholders	Section of ESIA where addressed
30 April 2019	National Forestry Authority (NFA) officials	Concerns were raised about the substantial habitat loss surrounding Namanve Forest Reserve and degradation of natural wetland. This is a very sensitive habitat and few areas of original swamp remains in the areas. Encroachment into the Forest Reserve for plantations (sugar cane and sweet potato) and livestock grazing further degrades the habitat is a threat to Namanve. The construction and operation of the KIBP will have major impacts on the wetland habitat. The boundary of the National Forest was discussed and information regarding historic land uses, encroachment, land ownership and management of the Forest Reserve.	Chapter 6
30 April 2019	Several PAPs across KIBP site	Introduction to potential displacement impact, process for conducting household census surveys, mobilisation of other potential PAPs to participate in surveys, and overview of livelihood restoration planning process timeframes and stages	Chapter 12
1-4 May 2019	local council members of various villages	Demographic and socio-economic conditions of households were discussed, and households potentially affected by economic displacement identified, with local councils of Kazinga Main, Kireku Railway, Namilyango, Degeya, Kireku Main, Namataba, and Koolo	Chapter 12
1-7 May 2019	Various PAPs	Household census undertaken with PAPs based in villages of Butto, Hassan Tourabi, Kazinga Main, Mawotto, Kireku Railway, Namataba, Koolo-Buwanyi, Namilyango, Degeya as part of the livelihood restoration planning.	Volume IV – Livelihood Restoration Plan
2 May 2019	Farmers working on KIBP site	Farmers' knowledge of fauna and flora present within the Scheme area was discussed. There were concerns about the pollution of Lake Victoria due to the KIBP and impacts from drainage and waste disposal, and the increased probability of siltation within River Namanve that could result in flooding.	Chapter 15
4 May 2019	NFA officials, GIS specialists	A GIS specialist was consulted to view and gain access to Forest Reserve boundary information, view historic land cover mapping and discuss online information sources. The NFA library was also visited to access hard copies of Forest Reserve information, management plans and biodiversity study data within the Namanve area. They confirmed that there is no approved management plan for Namanve Forest Reserve.	Chapter 6
6-8 May 2019	Hassan Tourabi, Mawotto, Nantabulirwa local council members	Demographic and socio-economic conditions of households were discussed, and households potentially affected by economic displacement identified.	Chapter 12
17 May 2019	Officials of Ministry of Water & Environment (Wetlands Management Department, WMD)	WMD made suggestions about how UIA and WMD can work together for the protection of wetland in the KIBP site. The WMD discussed several recommendations for the UIA to take into consideration for wetland management in the park. This included: • Paying offsets for wetlands lost should be considered • UIA and WMD should plan to undertake economic evaluation of all wetlands remaining in KIBP to inform decisions about their importance and proper management • A joint multi-sectoral monitoring and management taskforce should be created to oversee wetlands and other socio-environmental issues of the park's construction and operation UIA should develop KIBP on principles of an eco-friendly industrial park	Chapter 6

17.4.4 Stage 3: Draft ESIA Report Consultation and Disclosure

Following approval of the draft ESIA by the client, meetings will be held to disclose the ESIA package to relevant stakeholders as shown in Table 17.4. The table will be populated with details on the meetings held in the final iteration of the ESIA. The draft ESIA disclosure events will allow stakeholder feedback to be incorporated in to the final ESIA.

The disclosure activities will be organised as follows:

- Announcements of public consultation activities to gather opinions on the draft ESIA results will be made using culturally appropriate means including local newspapers, radio, the Scheme website and consultation with key stakeholders and communities. The ESIA Non-Technical Summary (NTS) will be available for review. Public consultation activities will provide notice with location and timing details. Letters will also be sent to notify selected stakeholders.
- The ESIA consultant and the UIA will present non-technical information about the ESIA findings, focusing on potential impacts and mitigation. A feedback form will be available to allow for comments (including anonymous ones) to be submitted.
- Comments on the ESIA findings will be forwarded by ESIA project manager to the technical specialists to be addressed in the final ESIA.
- ESIA feedback collection will stay open for one month after announcement of disclosure. Responses will be provided to those presenting questions as soon as is reasonably possible, with the timing depending on the complexity of the issue and source of information needed to provide the answer.

The final ESIA documents will be disclosed on the Scheme website once finalised. The dates for the disclosure events are tentatively scheduled for the first two weeks of July 2019.

Table 17.4: Draft ESIA stakeholder engagement activities

Date	Interested and affected stakeholders	Issues raised by stakeholders	Section of ESIA where addressed
To be confirmed (tbc)	Residents and local village councils of all LAI villages Municipal and District authorities NGOs and community-based organisations	Key objectives include: • Disclose the full draft ESIA at locations accessible to local communities together with the NTS • Invite comments before finalisation of the ESIA • Respond to stakeholder concerns, queries or opinions on the predicted impacts and proposed mitigation and enhancement measures, and ensure they are addressed in the final ESIA Meetings will have open invitations to enable any interested stakeholders to attend, and held in locations accessible for all 12 LAI villages	

17.5 Stakeholder Engagement Planned Throughout the Lifetime of the Scheme

Stakeholder engagement will be planned to take place at times and locations that enable participation of diverse groups of stakeholders, and special care will be taken to encourage and enable women, the elderly and people with disabilities to take part. Table 17.5 below outlines the specific consultation and disclosure activities, their sequence and responsible parties. Specific timeframes within the construction phase will be updated following finalisation and confirmation of the construction schedule. The activities that have been completed are shown in grey.

Table 17.5: Stakeholder Engagement Programme

Activity	Timeframe	Responsibility
1) ESIA Phase Engagement		
Scoping phase		
ESIA early scoping phase meetings with key individuals and organisations, including introductory interviews and key informant interviews	1-4 April 2019	ESIA consultants and subconsultants
Scoping phase public consultation meeting to include disclosure of draft SEP and ESIA Scoping Report	17-19 April 2019	ESIA consultants and subconsultants
1) ESIA phase		
Private meetings with displacement-affected individuals to explain process for developing livelihood restoration plan and conduct socioeconomic and asset census	May 2019	ESIA consultants and subconsultants
Consultations and interviews with key village leaders to identify baseline information and discuss impact significance and mitigation and enhancement measures	May-June 2019	ESIA consultants and subconsultants
Consultation meetings with relevant NGOs and governmental authorities to seek input on potential Scheme impacts and mitigation measures, key social issues in Scheme AoI and appropriate community investment initiatives to benefit local communities	May-June 2019	ESIA consultants and subconsultants
Announcement of draft ESIA disclosure	June 2019	ESIA consultants and subconsultants
Draft ESIA public consultation meeting	June 2019	ESIA consultants and subconsultants
Disclose draft ESIA Report and related documents	June 2019	ESIA consultants and subconsultants
Disclose final ESIA and related documents	July 2019	Lagan-Dott/UIA
Engagement with potentially affected landowners and users concerning land acquisition process	July 2019	Lagan-Dott/UIA
2) Construction Phase Engagement		
Update SEP	Prior to the start of constructions and thereafter twice a year	Lagan-Dott/UIA
Appoint community liaison officer (CLO)	Q3 2019	Lagan-Dott/UIA
Community disclosure and consultation of construction and delivery schedules	Q3 2019	Lagan-Dott/UIA
Consultations on local recruitment approaches	Q4 2019	Lagan-Dott/UIA
Ongoing community liaison and grievance process including disclosure of CLO contact details, and disclosure of key E&S documents including community health and safety plan, traffic management plan and EPRP	Q4 2019-2023	Lagan-Dott/UIA
Community meetings to conduct ongoing, regular follow-up of affected communities' access to ecosystem services, and other community issues relating to the Scheme	2020-2023	Lagan-Dott/UIA
Regular updates of website, social media, in newspapers and on radio	2020-2023	UIA
Update ESMP	Annual	Lagan-Dott/UIA
Annual Reporting	Annual	Lagan-Dott/UIA
3) Operation Phase Engagement		
Grievance logging, resolution and reporting		
Update SEP	Prior to the start of operations and thereafter annual	UIA
Annual Reporting	Annual	UIA

18. Summary Conclusion

18.1 Introduction

This chapter summarises the findings of the impact assessments reported in this ES. Likely significant effects are tabulated in Table 18.1. Topic specific impact assessments are presented in detail in Chapters 5 - 15 of this report.

To assist in the understanding of the summary, findings several assessment fundamentals are outlined below.

18.2 Significance of Effects

The significance of environmental effects is largely defined by reference to two key factors:

- The ‘value’ or ‘sensitivity’ of the receptor; and
- The ‘magnitude’ or ‘scale’ of the impact.

In most cases, effects are defined according to the following broad descriptors:

- Adverse or Beneficial (i.e. they are undesirable effects, or they represent an improvement over the baseline situation);
- Construction or operational (i.e. caused by the construction of the Scheme, or by the operation of the Schemes after opening);
- Temporary or permanent (i.e. they are felt for a limited period of time, or they would be felt indefinitely); and
- Significant or not significant.

Chapter 4 in describes the general approach to the environmental assessment for each topic. For most topics, the significance of an effect is defined in five categories (Neutral, Slight, Moderate, Large and Very Large). With the addition of the terms ‘Adverse’ or ‘Beneficial’, the categories can be applied as a balanced nine-point scale (Neutral; Slight Adverse; Moderate Adverse; Large Adverse; Very Large Adverse; Slight Beneficial; Moderate Beneficial, Large Beneficial and Very Large Beneficial).

In this assessment, effects that are Moderate or greater are deemed ‘significant’.

Certain topics in this assessment have used a different approach in assessing the level of significance in accordance with discipline specific best practice guidance or based on professional judgement of the assessor. The specific approach applied to each environmental topic is fully described in the relevant technical chapter (see Chapters xx-xx).

18.3 Mitigation

Measures to mitigate the effects of the Scheme have been identified and included within the technical chapters (see Chapters 5 - 15), as summarised in the ESMP (See Chapter 19). These mitigation measures have been taken into account in the assessment of residual effects for each topic.

18.4 Residual Effects

Following implementation of mitigation, the environmental effects envisaged to remain are referred to as residual effects. These are described in each topic chapter.

Some design features and mitigation measures may result in an environmental improvement. In these instances, the residual effect is recorded as 'beneficial'.

Table 18.1 summarises the likely significant effects (i.e. residual effects with a significance of Moderate Adverse / Beneficial, or greater).

Table 18.1: Summary of significant residual environmental effects

Topic	Significant Residual Effects
Construction Phase	
Air Quality	No significant residual effects.
Biodiversity	• Habitat loss of approximately 0.95km2 within the Forest Reserve, habitat degradation within 500m of the Scheme site and spread of Alien Invasive Species within Forest Reserve; • Pollution to Lake Victoria from effluents and spread of Alien Invasive Species; • Pollution to River Namanve from effluents, siltation and increased risk of flooding and spread of Alien Invasive Species; • Disturbance to birds from human activities, habitat and flora loss and degradation and hunting and poaching of wildlife due to improved access roads; • Disturbance to mammals from human activities, habitat loss and degradation, injury or death, increase in road kills and injuries and hunting and poaching of wildlife due to improved access roads.
Geology	No significant residual effects
Greenhouse Gases	• Emissions from the construction phase of the Scheme will represent a small part of national GHG emissions, at around 0.15% of 2014 levels (including land-use change and forestry).
Heritage	No significant residual effects
Landscape and Visual	• Change in tranquillity of the landscape character due to temporary presence of HGV movements and earthworks to impact representative views from settled cultivated land viewpoints during construction and operation • Removal of the reminder of wetland vegetation and increase of anthropization of a natural area to impact visitors to the Namanve wetland during construction and operation
Noise and Vibration	No significant residual effects.
Socioeconomics	• Economic displacement upon informal land users of KIBP site; • Temporary employment generation for LAI villages and Scheme workers; • Labour and occupational health and safety risks for Scheme workers; • Increased revenue for local and regional businesses for Local and regional businesses and WAI; • Scheme-induced in-migration for LAI villages; • Traffic and other community health and safety hazards for LAI villages.
Transport and Access	No significant residual effects.
Waste and Materials	• Waste generation – depletion of landfills impacting soil, biodiversity and human receptors.
Water Resources	• Runoff of hazardous or poisonous substances from the cleaning of vehicles, machinery and equipment upon surface waters and groundwater.
Cumulative Effects	• Cumulative effects upon air quality and noise • Cumulative effects upon visual amenity • Cumulative effects upon the Forest Reserve • Cumulative effects upon flora and fauna • Cumulative effects upon external roads users
Operational Phase	
Air Quality	No significant residual effects.
Biodiversity	• Habitat loss of approximately 0.95km2 within the Forest Reserve, habitat degradation within 500m of the Scheme site and spread of Alien Invasive Species within Forest Reserve; • Pollution to Lake Victoria from effluents and spread of Alien Invasive Species;

Topic	Significant Residual Effects
	• Pollution to River Namanve from effluents, siltation and increased risk of flooding and spread of Alien Invasive Species; • Disturbance to birds from human activities, habitat and flora loss and degradation and hunting and poaching of wildlife due to improved access roads; • Disturbance to mammals from human activities, habitat loss and degradation, injury or death, increase in road kills and injuries and hunting and poaching of wildlife due to improved access roads.
Greenhouse Gases	Annual operational GHG emissions would account for around 5% of national GHG emissions at 2014 levels (including land-use change and forestry). Emissions are likely to exceed the IFC PS3 threshold for GHG quantification (25MtCO_2/ year).
Heritage	No significant residual effects
Landscape and Visual	• Change in tranquillity of the landscape character for representative views from urban viewpoints due to significant HGV movements and high density of new business and industrial units; • Removal of the reminder of wetland vegetation and increase of anthropization of a natural area to impact visitors to the Namanve wetland during construction and operation.
Noise and Vibration	No significant residual effects.
Socioeconomics	• Increased revenue for local and regional businesses and governments and WAI.
Transport and Access	• Reduced capacity of Kampala Jinja and Old Kampala Jinja Road for motorists; • Reduced Road Safety on access roads for pedestrians and cyclists; • Public Transport Provision for employees and users of the site; • Parking provision for visitors and users of the site.
Waste and Materials	• Inappropriate handling and storage of hazardous waste to impact Human Receptors, Landscape, Biodiversity, Surface Water Bodies, Soil, Groundwater • Depletion of landfills to impact Soil, Biodiversity and Human Receptors.
Water Resources	• Increased surface runoff and erosion of topsoil due to the lack of permeable areas, affecting surface water.
Cumulative Effects	• Cumulative effects upon visual amenity • Cumulative effects upon the Forest Reserve • Cumulative effects upon flora and fauna

19. Environmental and Social Management Plan

19.1 Introduction

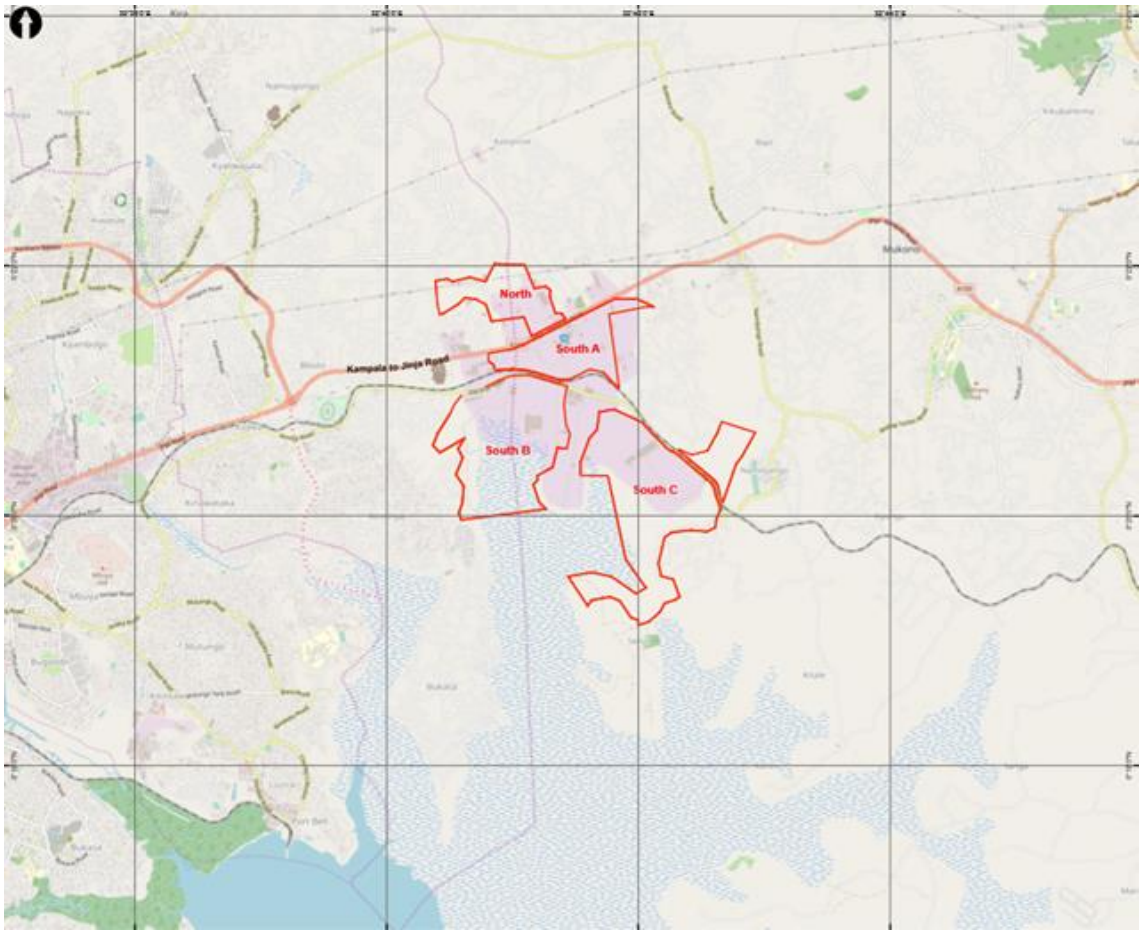
This chapter provides an outline Environmental and Social Management Plan (ESMP) for the Scheme which will be taken forward for further development as the Scheme progresses.

19.1.1 Overview and purpose

19.1.1.1 The Scheme

The Government of Uganda, through the Uganda Investment Authority (UIA) is supporting the development of the Kampala Industrial Business Park (KIBP), located at Namanve near Kampala, Uganda. The Scheme covers 894ha. It is envisioned that the KIBP will be a model business park, providing common-user facilities, offer collective services and outsourcing opportunities, and an improved business environment.

Figure 19.1 KIBP location plan (KIBP boundary indicated by red line)



To enable individual plot development, infrastructure for the overarching KIBP is required. This infrastructure will include the provision of road, rail, water, power supply, and communications. These infrastructure components comprise the assessed Scheme. As the development of privately-managed individual plots are subject to their own ESIA (Environmental and Social Impact Assessment), they have not been assessed within the ESIA or this ESMP.

19.1.1.2 Overview of ESIA and Scoping

A Scoping Opinion from National Environmental Management Authority (NEMA) was provided in 31st of May 2019, which approved the Terms of Reference submitted for the ESIA, noting that the ESIA only considers the infrastructure to support the KIBP, and not the individual plot developments.

The topics covered by the ESIA are

- Water Resources;
- Geology and Soils;
- Biodiversity and Conservation;
- Air Quality;
- Greenhouse Gas (GHG) Emissions;
- Noise and Vibration;
- Waste and Materials Management;
- Landscape and Visual Amenity;
- Socioeconomic Characteristics ;
- Cultural Heritage and Archaeology;
- Traffic and Transport; and
- Cumulative Impacts.

Each individual assessment covers both construction and operational impacts, with the exception of Cultural Heritage and Archaeology, for which operational impacts were scoped out.

19.1.2 Scope and development of the ESMP

The ESMP applies to the design, construction and operational phases of the Scheme and to all personnel employed at the Scheme in accordance with their tasks and responsibilities.

This document is an overarching framework for environmental and social management. The Sponsor and EPC contractor will be required to transpose the measures and principles of this framework document into a Construction Environmental and Social Management Plan (CESMP) and Operational Environmental and Social Management Plan (OESMP). The CESMP and OESMP will detail environmental control steps necessary to reduce environmental and social impacts through the entire construction and operation phase of the Scheme.

19.1.3 The purpose of this document

This document describes an outline structure to establish the environmental and social management plans (ESMPs) and environmental and social management system (ESMS) to address the impacts identified in the ESIA for the KIBP. The aim of the plan is to ensure a consistent approach towards the identification, control, management and reduction of Environmental and Social (E&S) risks and impacts associated with the construction and operation of the Scheme. The plan consolidates and builds on the mitigation and monitoring requirements identified in this ESIA. It further acts as a framework for the Engineering,

Procurement and Construction (EPC) contractor, Lagan-Dott, to develop their mitigation and management plans.

The Sponsor (known herein as the UIA) and the EPC Contractor (known herein as Lagan-Dott) will be required to develop standalone mitigation and monitoring plans, implementing the requirements contained within this document as a minimum through and Environmental Management System.

The plan has been developed to comply with all national laws as well as Good International Industry Practice (GIIP). The overarching reference laws and standards applied are:

- National Environment Management Policy for Uganda;
- National Environment Act, Cap 153 (2017) and its subsequent Statutory Instruments (SI);
- International Finance Corporation (IFC) Performance Standards (2012) ; and
- World Bank Group General Environmental, Health and Safety (ESHS) Guidelines (2007).

19.1.4 Structure of the ESMP

This document comprises the following key elements:

Section 19.2 outlines the institutional arrangements through which the ESMP will be implemented and the relationship and responsibilities between UIA and Lagan-Dott. Where relevant, a number of capacity building measures have been identified to ensure that the institutional arrangements are appropriate and qualified for the allocated tasks.

Section 19.3 presents an overview of the training requirements for each entity and responsible person associated with the Scheme management.

Section 19.4 provides an outline on the various site-specific ESHS management and monitoring plans to be implemented as part of the ESMP by UIA and Lagan-Dott. The sub-plans are intended to ensure that the various mitigation measures / activities identified through the ESIA process are incorporated by the Scheme in a structured way. Mitigation measures are presented for each sub-plan, together with monitoring measures and key performance indicators (KPIs) where applicable.

Section 19.5 of the ESMP provides an overview of monitoring and reporting requirements associated with the activities and commitments contained within the ESMP documentation. The monitoring and reporting requirements include an adaptive management capacity to the ESMP reflecting that it is intended to be a live document subject to regular review and update as the Scheme evolves.

19.2 Implementation and institutional arrangements

19.2.1 Overview

Key stakeholders involved in the Scheme's construction and operation will be the UIA – the owner and project developer, and Lagan-Dott – the organisation employed to construct the Scheme. The UIA will employ Lagan-Dott on a build – own – transfer basis.

19.2.2 Roles and responsibilities

19.2.2.1 The UIA's role

The UIA will have the overall responsibility for the compliance of the Scheme during the construction and operation phases and for the implementation of the mitigation measures

outlined within this ESMP. The UIA will ensure that Lagan-Dott agreements legally oblige compliance with this ESMP using appropriate national and international requirements.

The UIA is to monitor Lagan-Dott's performance and all subcontractors on a regular basis, and will undertake the following throughout the duration of the construction period:

- Review the effectiveness and comprehensiveness of Lagan-Dott's documents (for example, associated sub-management plans, procedures, and mechanisms for reporting, record keeping and auditing) against the requirements of this ESMP;
- Undertake regular audits;
- Continuously check records to allow identification of patterns;
- Set up a contractor reporting structure; and
- Conduct meetings at a sufficient frequency to ensure E&S is a priority agenda item.

Mitigation measures described for the operational phase will be implemented by the UIA using the proposed system described in Section 19.4.

19.2.2.2 Lagan-Dott

Lagan-Dott will be required to effectively implement the specific requirements outlined within the ESMP during the construction phase through the development of a dedicated CESMP and subsequent ESMS. This will include ensuring that all Lagan-Dott and sub contractor Method Statements align with the requirements of the ESMP.

Lagan-Dott will be required to undertake regular monitoring and inspections of the Scheme site and will be required to keep up to date records as prescribed in this ESMP. These records will contain sufficient detail to allow the reader to have a full understanding of the progress reported. The format and frequency of these reports will be agreed with the UIA. Lagan-Dott will ensure that there is appropriately qualified and trained staff to provide sufficient levels of oversight for E&S compliance. Furthermore, Lagan-Dott will ensure that these staff members are adequately supported by the wider site management team.

Lagan-Dott will be required to notify the Scheme UIA of any E&S incidents on site under an agreed reporting timeframe with sufficient detail to enable the UIA to understand the associated risks and impacts.

19.2.3 Construction Environmental, Social, Health and Safety (ESHS) management

19.2.3.1 The UIA's ESHS management system and structure

The preparation of an Environmental and Social Management System is crucial to ensure a systematic approach to managing environmental and social performance of the KIBP, and guarantee that contractors and individual developers adhere to the environmental and social targets set out in E&S policies. The Environmental and Social Management System will cover the UIA's responsibilities throughout the lifetime of the Scheme, and will be required to be in line with the principles of ISO 14001:2015, OHSAS 18001:2007 or equivalent and IFC Performance Standards 1 requirements, identifying as a minimum:

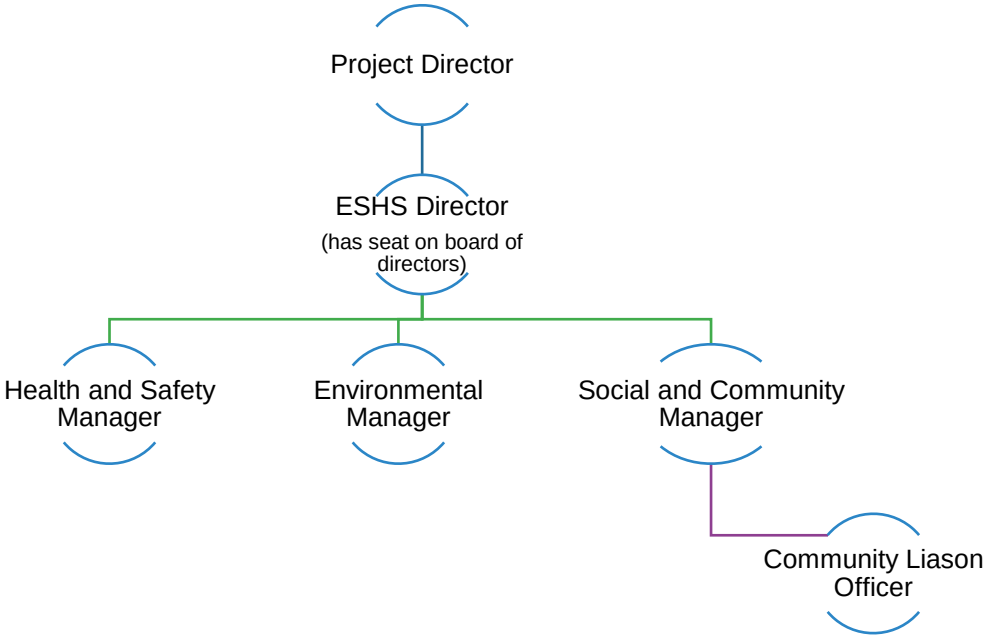
- ESHS policy: The ESMS will define the UIA's E&S objectives and principles that the organisaiton has committed to, enabling a high standard of E&S performance. All applicable legislation wiill be applied including international laws and should be alignted with IFC PS1-8 requirements. The system will identify the responsible persons for compliance with the committments and will be distributed to staff at all levels.

- Identification of risks and impacts: A risks and impacts register will be created, idenitifying the type, scale and location of the Scheme. The scope will be consistant with GIIP and will identify all E&S receptors and assess their sensitivity to the acitivites associated with the Scheme.
- Management programmes: The system will provide plans that describe any avoidance, mitigation aor compensation required to suficiently address the likely impacts of the Scheme on identified receptors. Performance measures for benchmarking will be identified and E&S Action Plans establish to provide an effective resolution to any negative impacts.
- Organisational capacity and competency: the system will establish and strenghten an organisational structure detailing roles, responsiblities and the Scheme's authority structure. This structure will be communicated to relevant personel within the wider organisation and to relevant third party stakeholders.
- Emergency preparedness and response: An Emergency Response Plan identifying all possible emergency events and the corresponding actions required to prevent occurance or escalation, ensuring a minimisation of harm to all E&S receptors. Third party stakeholders will be contacted and regular practice of the action plan will be specified within the plan.
- Stakeholder engagement: a Stakeholder Engagement Plan will identify all relevant stakeholders within the Affected Communities including indigenous and vulnerable groups. The plan will contain a schedule of informed consulation and participation actions, external communications and grievance mechanisms, as well as the mechanisms for regular reporting to Affected Communities.
- Monitoring and review: The system will set out the process and the frequency of the monitoring and reviewing requirements to ensure the system remains effective and relevant.

19.2.3.2 ESHS management structure

The UIA's personnel key roles and responsibilities will be set out in procedures created as part of an ESHS management system, including organisational and individual working procedures. The UIA will establish an ESHS department to oversee and manage all ESHS issues during the construction and operational phases in line with the requirements defined in this document. A preliminary staffing structure of the ESHS department is set out in Figure 19.2 and in Table 19.1.

Figure 19.2: Preliminary ESHS organogram of UIA



Source: Mott MacDonald

Table 19.1: The UIA ESHS department - Key roles and responsibilities

Role	Responsibility	Location	Construction	Operation
ESHS Director	Policy, overall responsibility, government liaison	Head office with regular visits to site	1	1
Environment manager	Compliance reporting and day to day oversight of environmental issues.	Head office with regular visits to site	1	1
Health and Safety (H&S) manager	Compliance reporting on all H&S issues to the ESHS Director	On site	1	1
Social and community manager	Compliance reporting and day to day oversight of social issues.	On site	1	1
Community liaison officers	Day to day interaction with all people affected by the Scheme	On site	2	1

While some evolution of the department structure, staff numbers and responsibilities is expected as the Scheme moves through construction into operation, the overall structure and roles and responsibilities will be defined during its inception and modifications implemented as required.

19.2.3.3 Lagan-Dott ESHS management

Lagan-Dott will establish a Scheme specific Environmental Management System in line with the principles presented in section 19.2.3.1 above. The Company will seek third party accreditation for the proposal and seek to have it audited on a bi-annual basis by a third party for compliance against the ISO standard.

These standards place strong emphasis on the need for continuous improvement of the ESHS management systems and resultant ESHS management performance.

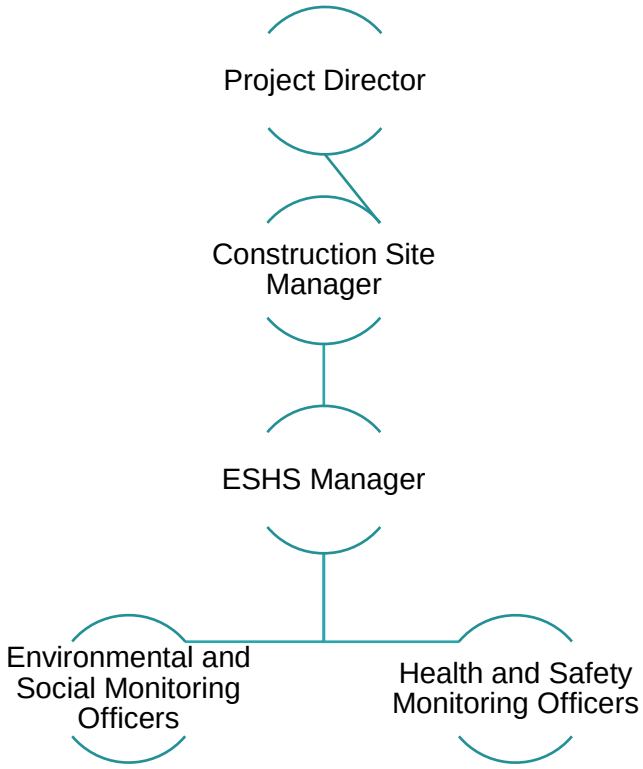
Lagan-Dott will be responsible for the following actions:

- Develop a Scheme specific CESMP. The CESMP will be committed to, and signed off by, the senior management of Lagan-Dott;
- Contribute to other parallel and sub plans ensuring appropriate inclusion of ESHS matters;
- Implement the requirements of the mitigation activities in the CESMP ;
- Provide a construction site layout plan that identifies key activity areas in line with the relevant requirements;
- Produce detailed method statements relating to key ESHS activities that include the requirements of the plans contained herein during the Scheme construction;
- Identify the need for and provide all training necessary to oversee and implement ESMP requirements prior to and throughout construction as appropriate;
- Be responsible for producing a comprehensive suite of ESHS management and coordination procedures;
- Ensure there is always an ESHS person on site during the works. This person must be full time, appropriately qualified, and have greater than 10 years relevant experience. The ESHS manager will be supported by an appropriately sized and qualified ESHS team;
- Agree a sufficient ESHS site reporting regime with the UIA and OE. The reporting will be of sufficient detail and frequency to allow non-compliance issues to be identified and addressed in a timely manner. Any opportunities for lessons learned will be included within the wider site's toolbox talks; and
- Ensure site documents are 'living documents', updated as necessary to ensure its relevance to the Scheme.

All Lagan-Dott staff will be responsible for ESHS management in their specific role. The responsibilities of dedicated ESHS staff is then focused on the monitoring of and reporting on CESMP and ESMS commitments and improvements, and any additional plans outside of the work of construction site staff.

Lagan-Dott will be required to be responsible for sub-contractor(s)' performance, including sub-contractor(s) adherence to the requirements of the CESMP. All sub-contractor(s) will be required to have dedicated environmental and social staff to implement the CESMP and to monitor and manage this on an on-going basis. The sub-contractor(s) staff will be required to liaise closely with Lagan-Dott ESHS staff including the provision of monthly reports and participation in weekly construction review meetings, for example. A typical construction contractor ESHS staffing structure that could be expected for this Scheme is set out in Figure 19.3 and Table 19.2.

Figure 19.3: Typical EPC/EPCM structure



Source: Mott MacDonald

Table 19.2: Typical contractor ESHS staffing

Role	Responsiblity	Number
Project Director	Overall responsibility for the entire EPC contract, including ESHS performance of Scheme contracted works, including sub-contractor(s).	1
Construction site manager	Coordination of all construction activities, including practical implementation of ESHS requirements at site and onsite ESHS performance.	1
ESHS Manager	Monitoring and reporting of Scheme ESHS performance. ESHS regulatory interface. Management and monitoring of CESMP plans implementation and environmental issues and performance Manages the team Reports into the site manager	1
Environmental and social monitoring officers	Monitoring and enforcement of CESMP plans implementation and environmental issues and performance	Number of officers may vary depending on level of construction activity. This number will be agreed with the UIA

Role	Responsiblity	Number
Health and safety monitoring officers	Monitoring of CESMP plans implementation and report health and safety issues to the ESHS Manager	Number of officers may vary depending on level of construction activity. This number will be agreed with the UIA

Source: Mott MacDonald

19.2.3.4 Lagan-Dott construction site manager

Lagan-Dott Construction Site Manager will co-ordinate inputs from the ESHS Manager and assist in the allocation of staff with the skills for applying the CESMP on site. It is envisaged that the Construction Manager will:

- Ensure that the ESHS Manager is adequately qualified to understand and implement the CESMP;
- Nominate personnel to assist the environment and social officer as required and generally provide support for the ESHS manager;
- Be responsible for official communications with the UIA with regard to environmental issues and non-compliances;
- Supervising and overseeing the direction of the project, ensuring that the specifications and requirements are met, reviewing progress and liaising with quantity surveyors to monitor costs;
- Liaising with the UIA, other construction professionals and, where necessary, members of the public;
- Coordinating and supervising construction workers;
- Making safety inspections and ensuring construction and site safety;
- Checking and preparing site reports, designs and drawings;
- Maintaining quality control procedures;
- Assessing and minimising risk; and
- Helping to negotiating contracts and securing permits and licences.

19.2.3.5 Lagan-Dott ESHS Manager

Lagan-Dott will be required to nominate a person to take the primary responsibility for day-to-day implementation of the CESMP and parallel management plans. The formal job description will be in accordance with the elements provided below. The nominated person will carry out the following responsibilities:

- Take prime responsibility for implementation of the environmental management;
- Oversee and ensure the implementation of the CESMP and sub plans (with support from Lagan-Dott Construction Site Manager, detailed below) and ensure all sub-contractor(s) are in compliance with the CESMP requirements;
- Review and report performance to Lagan-Dott construction site manager, the OE and the UIA;
- Review sub–contractor(s) environmental protection/mitigation measures to ensure compliance with the CESMP;
- Report on a daily basis any CESMP non-compliances to Lagan-Dott construction manager, agree remedial actions and contribute/assist in the provision of toolbox talks;
- Carry out regular environmental awareness sessions and assist personnel in applying environmental standards on site;

- Conduct regular audits / inspections to check that committed ESHS measures are being implemented;
- Innovate new processes and procedures to ensure continued improvement of ESHS standards on site; and
- Act as the first point of contact on environmental matters for Lagan-Dott, for the government authorities, other external bodies and the general public.

There are certain aspects that Lagan-Dott ESHS Manager will be required to have knowledge and experience in, including:

- An understanding of the GIIP of environmental management;
- Familiarity with local environmental legislation and the likely developments in this field;
- Practical operation of environmental monitoring techniques;
- Managing monitoring teams and leading root cause investigations where required;
- Ability to summarise environmental data in order to produce concise and conclusive reports;
- Hold the confidence to enforce strict, but pragmatic, environmental control procedures and to motivate the construction and engage staff to work with a high level of environmental awareness; and
- Minimum of ten years practical experience on construction sites.

19.2.3.6 ESHS monitoring officers

Lagan-Dott ESHS monitoring officers will complete surveys and daily checks to confirm E&S compliance regarding aspects such as noise, air quality, geology, biodiversity, heritage, landscape and visual, transport, water quality, waste management, spill management and health and safety. Where evidence of pollution or contamination is found, ESHS monitoring officers will contact those responsible and request the issue is rectified. They will be responsible for ensuring previously identified non-conformities are completed to an appropriate standard, enlisting support from the ESHS site manager where required. The officers will have an ability to explain technical matters simply to non-scientific audiences.

19.2.4 Operational ESHS management

The proposed organisational structure for the operational phase will be largely similar to that proposed for the construction phase as shown in section 19.2.3.1. As the Scheme nears operation and through operation, the institutional structure will be adapted to best meet the requirements of the Scheme at the time.

19.3 Training programme

19.3.1 Overview

In achieving the approach to environmental management described in previous sections, it is implicit that all staff receive the required training in both general and job-specific terms. This training will not be considered a stand-alone exercise but must form an integral part of on-going training programs.

E&S training will help to ensure that the requirements of the ESIA and ESMP are clearly understood and followed by all Scheme personnel throughout the Scheme lifetime. The environmental and social training program will be finalised before the commencement of the Project, during the detailed design phase. A more detailed training plan will be developed by the UIA and Lagan-Dott prior to construction.

19.3.2 General E&S awareness training

All staff members will be required to attend in-house training courses on general environmental awareness. This will be delivered in a consistent structure, irrespective of the staff designations attending. The main objective of this type of training is to provide:

- A general understanding of the environmental risks associated with the Project;
- Local, national and international actions that are required to manage these risks; and
- Clarification of the UIA's environmental policy and its practical implementation, stressing that it carries implications for the working methods and responsibilities for all employees.

Continual awareness of environment matters will be maintained. The E&S Policy Statement will be on permanent display in prominent positions around the Scheme sites, such as the administration block, reception area, the control room, staff catering facilities and construction site offices.

E&S incidents awareness training will include emergency preparedness to deal with emergency situations that may impact the environment (e.g. chemical / fuel spillage) and include emphasis on the importance of reporting and sharing lessons with colleagues.

19.3.3 Job specific training

19.3.3.1 Environmental and Social Issues Training

All Scheme personnel are to attend a site induction prior to entering the Scheme site.

Specific or specialist E&S training will be provided as follows:

- For employees who carry out the same or similar roles as the Contractor(s) supervisors;
- For construction workers as applicable to their job responsibilities, mainly through toolbox talks; and
- For selected workers responsible for emergency responses to spills.

The UIA, Lagan-Dott and subcontractors will each develop and maintain, as part of their ESMS, a training needs matrix and associated training programme to identify which specific job roles for their respective organisations require additional specialist training.

Specialist training will either be performed by suitable qualified in-house personnel or by approved external training providers.

19.3.4 Training Records

Staff will complete and sign an attendance sheet for all courses attended, including E&S awareness training and toolbox talks. It will also be recommended that staff complete a course evaluation sheet at the end of each course in order to assess the effectiveness of the training delivered. All records, including the course evaluation sheets and attendance sheets, will be held centrally.

All records, including the course evaluation and attendance sheets, will be accessible in a central location for the Contractor HSE Manager and made available during any audit conducted as part of the audit programme.

The ESHS department is to maintain records of all training provided to the UIA employees.

The frequency and content of the training will be reviewed regularly to ensure it is effective, delivered in the correct manner and to the correct audience. Lessons learned during the Scheme works will be incorporated into the training as they arise.

19.4 Environmental and social management programs

19.4.1 Overview

This section details additional studies and management plans which will be required to avoid, minimise and compensate for the impacts identified in the ESIA. These plans have been identified as part of the ESIA process and are presented in Table 19.4, Table 19.5 and Table 19.6. The measures are grouped into tables to show which stage of the Scheme they are required to be completed in;

- Additional studies required to inform detailed design and CESMP.
- Construction Environmental and Social Management Subplans. To be finalised prior to any site preparation and construction works
- Operation Environmental and Social Management Subplans. To be finalised prior to operation commencing.

A summary of the plan/policy along with the Scheme phase and responsible party is shown in Table 19.3.

Table 19.3: Summary of Scheme plan/policy requirements

Plan/policy	Responsible party	Applicable phase of project
Flood Risk Assessment (FLA)	Lagan-Dott	Developed in parallel with detailed design. Fully implemented once detailed design is finalised
Biodiversity Action Plan (BAP)	UIA	
Livelihood Restoration Plan (LRP)	UIA	
Air and Dust Management Plan	Lagan-Dott	Construction
Chance Finds Procedure	Lagan-Dott	
Community Investment Plan	UIA	
Labour Management Plan	Lagan-Dott	
Workers code of conduct	Lagan-Dott	
Local Recruitment and Skills Development Plan UIA with support from Lagan-Dott	UIA with support from Lagan-Dott	
Local Content Strategy	UIA	
Occupational Health and Safety Plan	Lagan-Dott	
Community Health and Safety Plan	Lagan-Dott	
Construction Emergency Preparedness and Response Plan	Lagan-Dott	
Security Management Plan	UIA with support from Lagan-Dott	
Influx Management Plan	UIA	
Construction Traffic Management Plan	Lagan-Dott	
Construction Waste Water Management Strategy	Lagan-Dott	
Materials Management Plan (MMP)	Lagan-Dott	
Construction Waste Management Plan	Lagan-Dott	
Operational Site Waste Management Strategy (SWMS)	UIA with support from Lagan-Dott	Operation
Operational Emergency Preparedness and Response Plan	UIA	

Plan/policy	Responsible party	Applicable phase of project
Operational Environmental and Social Policy	UIA	
Operational Human Resources Policy	UIA	
Retrenchment Plan	UIA	
Operational Traffic Management Plan	UIA	
Stakeholder Engagement Plan (SEP)	UIA	

Source: Mott MacDonald, 2019

Table 19.4 details the plans and policies that will be required to inform detailed design and CESMP. These studies include baseline information that will require further assessment to ensure all avoidance and mitigation measures are appropriately captured and allocated.

Table 19.5 details the plans and policies that will be required to be produced prior to construction commencing to be included within the Construction Environmental and Social Management Plan (CESMP).

Table 19.6 show documents that are required to be produced prior to the Scheme's operational period, to be part of the Operations Environmental and Social Management Plan (OESMP).

The plans and procedures identified are framework documents only and will need to be developed further by the UIA and/or Lagan-Dott prior to construction/operation. Plans and policies identified in this section have been taken from Chapter 3 of this ESIA.

19.4.2 Additional studies required to inform detailed design and construction management plans

Table 19.4: Additional studies required to inform detailed design and construction management plans

Plan title	Purpose	Detail of Plans and Policies	Preparation phase	Responsibility
Flood Risk Assessment (FLA)	This plan will provide detailed modelling assessment of the flood risk across the Scheme site and include avoidance and mitigation measures required for the final Scheme design	The principal recommendation is for a hydraulic model to be developed for the KIBP as part of a detailed flood risk assessment. Given the high-level nature of the preliminary flood risk assessment there is an important requirement for further investigations before the finalisation of mitigation measures. This will include a detailed flood risk assessment with the following activities: • Commissioning of topographic survey of the Namanve River catchment area, and inclusive drainage channels. The survey will need to extend to the downstream outlet into the wetlands; • development of hydrological analysis and hydraulic modelling of the watercourses to simulate flood water levels including; - model conceptualisation; - Digital Elevation Model (DEM) processing with detailed topography of the Scheme area including appropriate representation of channel network; - definition of boundary conditions and roughness parameters; - 2D hydraulic modelling across the Scheme area; - delimitation of flood outlines and estimation of maximum water depths and velocities; - consideration of the impacts of climate change on the hydrological analysis and flood flows; and - consideration of the uncertainties in the hydrological analysis and the impacts on flood flows. The following mitigation options have been highlighted as potential options to alleviate the impact of flooding on the KIBP: • upstream attenuation through wetland construction; • improving drainage system capacity to the following design: - Namanve River designed to a 50yr return period; and - smaller streams designed to 10yr return period. • enhancing culvert capacities; - Namanve River culverts to a 50yr return period; and - smaller streams culverts designed to a 25yr return period. • maintaining vegetation within the channels through regular cutting/trimming, including the stabilisation of channel sides; • implementing buffer strips and planting of vegetation for slope stabilisation upstream of the KIBP site; • constructing SuDS where possible, such as permeable pavements and swales; • further investigation to the pre-1900 Lake Victoria flood to assess the likelihood of a re-occurrence of a similar magnitude event and subsequent assessment of the site level; and • relocating high pollution risk activities to the higher site elevations, creating a stepped topographic site within the KIBP, or constructing platforms to raise certain industries that have the potential to cause pollution incidents. • hydraulic modelling will use the flood mitigation options listed above to test the various options and their likely impact to flooding on the site. This will aid the prioritisation of flood mitigation options to carry out. Scenarios will consider the River Namanve outlet become backed up with high Lake Victoria water levels. The options detailed above will be assessed for cost and for their wider benefits, such as water quality improvements. Thought will be given to whether these measures will continue to benefit the future development of the site, particularly with long-term planning in mind. Prior to the hydraulic modelling, initial communication and engagement with local authorities and communities to identify which flood mitigation measures could be adopted upstream of the site will be undertaken. This will include identifying possible areas for mitigation measures. A topographic survey will be commissioned prior to modelling for both the KIBP site and catchment area. The site design criteria for the channels, culverts and site level will also be reviewed and agreed with the relevant authorities.	In parallel with detailed design	Lagan-Dott
Biodiversity Action Plan (BAP)	This plan will set out the additional studies required to fully inform the biodiversity mitigation plan for the Scheme. This is to be developed as a standalone document and include a list of required in-depth ecological and invasive species baseline surveys, seasonal restrictions for surveys and activities during construction, compensation wetland requirements and invasive species removal and follow up procedures.	• Detailed biodiversity surveys will be conducted within KIBP and within 500m of the Scheme footprint prior to any vegetation clearance to inform mitigation and biodiversity offsetting. • Targeted surveys will be conducted for the grey-crowned crane, Basra reed warbler, papyrus yellow warbler and sitatunga which are globally and nationally threatened. • Surveys to identify areas infested with Acquatic Invasive Species (AIS) will be carried out and mapped. • The BAP will include a monitoring programme for biodiversity during construction and annually for the first three years of operation. • Off-site wetland habitat restoration (papyrus swamp) will be included in the BAP (see translocate wetland plants above). Adaptive management will be incorporated where impacts on habitats, flora and fauna are significant (the BAP will define significance following baseline data collection). Further measures are contained within Appendix A.	In parallel with detailed design	UIA with support from Lagan-Dott
Livelihood Restoration Plan (LRP)	This plan will detail compensation measures for housing, relocation assistance and livelihood restoration, enabling displacement-affected peoples standard of living and livelihoods to be at a minimum restored, or where possible improved.	In addition to efforts to avoid and minimise displacement impacts through the scheme design, a LRP will be used to mitigate livelihood displacement impacts. A preliminary LRP has been developed to accompany this ESMP (Appendix B), with the overarching aim to ensure that displacement-affected people's standard of living and livelihoods is at least restored, or where possible improved, so that it is addressed as a development opportunity. The preliminary LRP included in the ESIA describes the eligibility criteria, entitlements for compensation and livelihood restoration, compensation methodology, and income and livelihood restoration strategies. The data obtained has been extrapolated to conduct a	Developed in parallel with detailed design. Fully implemented once detailed design is finalised	UIA with support from Lagan-Dott

Plan title	Purpose	Detail of Plans and Policies	Preparation phase	Responsibility
		qualitative analysis of the anticipated socioeconomic characteristics and assets for the remaining households, identify the sensitivity of affected peoples and enable a baseline vulnerability profile of the affected households. Opportunities and constraints for livelihood restoration, diversification and other community development outcomes are defined. The plan also describes the grievance management process, proposed monitoring and evaluation framework and provides a proposed entitlements matrix for the LRP. Following submission of this draft ESIA and preliminary LRP, a full implementation-ready LRP will need to be prepared by UIA with support from Lagan-Dott, and fully implemented once the scheme design has been finalised. This will provide a detailed and quantified assessment of economic displacement for all affected households and businesses within the finalised Scheme boundaries, based on household socioeconomic and asset survey data collected for a 100% sample of the affected people. An outline Terms of Reference (ToR) for the development of a full LRP to meet national and international requirements is provided in the preliminary LRP. The capacity of the LRP implementation teams will be critical to success, and provisions for training and capacity building are provided in the LRP so that so that capacity constraints are not an insurmountable barrier to achieving the desired development outcomes.		

19.4.3 Construction and operational environmental and social management plans and subplans

The main framework documents and systems identified in the tables are the CESMP and the Operational ESMS. Section 19.4.3.1 and Table 19.5 describe the minimum contents of these items.

19.4.3.1 Construction and Operational Environmental and Social Management Plan

An overarching CESMP will be prepared to provide guidance on the ESHS management approach to be adopted by Lagan-Dott and sub-contractors for all activities undertaken throughout the construction phase of the Scheme. The document will be treated as 'living' and will require periodic updates. The UIA will review and approve the document and oversee the implementation of the requirements within it.

The CESMP will be prepared prior to site preparation and construction works and will be supported by the following:

- Policies – overarching system of principles to guide the Scheme's environmental and social performance.
- Plans – additional, more detailed plans prepared by contractors related to specific aspects and areas which are impacted by their scope of works (i.e. waste management plan).
- Procedures – more specific work instructions established by the Developer, in collaboration with construction subcontractors, to support the implementation of the plans.

The document will detail the control steps necessary to reduce ESHS impacts through the entire construction phase of the project, identifying as a minimum:

- A description of the works;
- Regulatory requirements;
- Site organisation and management;
- Roles and responsibilities;
- Review, reporting and auditing procedures;
- Mitigation and protection measures;
- Monitoring requirements;
- Training requirements;
- Emergency response plans;
- Method statements (where applicable); and
- Full register of Environmental Actions and Commitments.

The CESMP will be supplemented by various sub-plans and procedures (detailed in 19.4.3.2) which will be developed to address key ESHS aspects identified during the ESIA process which will detail control procedures and define associated responsibilities for implementation.

Similarly, for the operational phase, an overarching OESMP will be prepared prior to operation of the project in accordance with national legislation, standards and guidelines. The structure and objectives of the report will largely be the same as the CESMP. UIA will be responsible for ensuring the project complies with mitigation measures outlined within this document.

19.4.3.2 Construction and Operational Environmental and Social Management sub-Plans

Table 19.5: Plans and Policies required for construction and operation

Plan title	Purpose	Minimum details to be included	Preparation phase	Responsibility	Measures contained in
Air and Dust Management Plan	This plan will identify all aspects of site works including demolition, earthworks, construction, track out (off-site vehicle movements), non-road Mobile Machinery (NRMM) activities ensuring that dust emissions are minimised to non-significant levels. Mitigation measures and monitoring requirements will also be included	• To mitigate against construction dust effects at receptors Minimising dust from material handling sources, such as conveyors and bins, by using covers and/or control equipment such as water suppressors; Minimising dust from open area sources, including storage piles, by using control measures such as installing enclosures and covers, and increasing the moisture content; • To mitigate against air emissions during construction Implementing dust suppression techniques on unpaved roads, such as applying water or non-toxic chemicals to minimize dust from vehicle movements; No bonfires and burning of waste materials shall be allowed; Planning land clearing, removal of topsoil and excess materials, location of haul roads, tips and stockpiles with due consideration to meteorological factors (e.g. precipitation, temperature, wind direction, and speed) and location of sensitive receptors; Designing, installing and applying a simple, linear layout for materials-handling operations to reduce the need for multiple transfer points; Compacting and periodically grading and maintaining roads; and Vegetating exposed surfaces of stockpiled materials. • To mitigate against emissions from mobile sources including on-road and off-road vehicles and mobile crushers Owners / operators to implement the manufacturer recommended engine maintenance programme regardless of the size or type of vehicle; Enforce a speed limit for Heavy Goods Vehicle (HGVs) on-site at 20km per hour; Drivers will be instructed on the benefits of driving practices that reduced both the risk of accidents and fuel consumption, including measured acceleration and driving within safe speed limits; Enforce a 'no-idling' policy; Old construction vehicles will be replaced with newer more fuel-efficient alternatives where possible; Convert high use vehicles to cleaner fuels where possible; Install and maintain emission control devices such as catalytic convertors; and Implement a regular vehicle maintenance and repair program. • To mitigate against the use of generators on the site Generators used will be of a modern design and well-maintained to minimise air pollutant emissions; and Consideration will be given to the location and height of exhaust pipes to ensure proper dispersion of pollutants. • To mitigate against dust emissions from blending, packing, loading, unloading and use of cement batching plants Containment and arrestment of dusty processes is the preferred option for control of emissions to air from processes handling cement; Suppression of dust using water or proprietary suppressants. Where water is used for dust suppression, processes require an adequate supply of water. To demonstrate an adequate water supply on tanks, a low-level alarm will be fitted; Protection of external sources, such as stockpiles and external conveyors, from wind whipping is necessary. There are various methods that may be used to this end. Crushed rock, sand or coarse aggregate, can be delivered, stored and handled so as to minimise dust emissions, for example by dampening or covering.	Pre-construction	Lagan-Dott	Site CESMP
Chance finds Procedure	This plan will provide procedural instructions on how individuals and the site management team will respond to a chance find of any buried heritage or human remains during the construction works.	During the period of the construction of the Scheme infrastructure which involves excavations, it is possible that chance finds will be encountered. These may include the following: • Archaeological heritage which has remained unnoticed in the past. • An encounter with a grave containing human remains which may have not been mentioned at the survey stage. In order to avoid potential damage to cultural property discovered during construction, workers must be trained and then vigilant to any relics found during excavation. A Chance Finds Procedure in line with IFC PS8, the World Bank's Physical Cultural Resources Policy Guidebook and GIIP will be developed and implemented for all groundworks during construction. The relevant authorities will be consulted to ensure that the procedure is acceptable to them and that it complies with local and national regulations. If any unexpected finds are encountered during earthworks or excavation works, the following mitigation approaches will be employed by the Project: • Work will be immediately stopped in the area • The find(s) will be demarked and protected via fencing / blocking off and the site manager and Project Environmental Officer will be contacted. • Notification will be issued to the Uganda Investment Authority. • In the case of archaeological artifacts discovery, the Uganda Investment Authority will inform the Uganda Museum and grant a period where specialists from the Department of Museums and Monuments excavate and curate the artifacts professionally. • In the case of discovered human remains the police will have to be notified and either the remains are taken for forensic investigation or the LC1 authorities sanction the reburial of the remains at another location. The contractor sponsor then meets the relocation and reburial expenses.	Pre-construction	Lagan-Dott	Site CESMP

Plan title	Purpose	Minimum details to be included	Preparation phase	Responsibility	Measures contained in
		• The cultural authority will be informed in order to seek guidance and specialist advice for management of the find(s) and how best to proceed, given its nature and extent • All finds will be recorded • Lagan-Dott Environmental Officer will submit a Chance Find Report to the UIAs Environment Manager within one day of the find. This will record as a minimum the date and time of the discovery, location of the discovery, description / photo of the Physical Cultural Resources, estimated weight and dimensions of the find and temporary protection that has been implemented (if any).			
Community Investment Plan (CIP)	This plan will aim to help mitigate the adverse impacts of Scheme induced in-migration, and local livelihoods impacts.	A needs-based community investment plan (CIP) will be developed and implemented as a mechanism to share Scheme benefits with locally affected communities. It will aim to help mitigate the adverse impacts of Scheme-induced in-migration, and local livelihoods impacts, and will be aligned with the LRP. It will provide opportunities for improved community infrastructure, health and education services so that benefits are shared with locally affected people through the Scheme contributing to addressing local poverty and development needs. The CIP will include consideration of measures such as: - Agricultural extension support: for Local Area of Impact (LAI) households who use grazing land in the KIBP site, through activities such as training, establishment of cooperatives, provision of micro-credit, provision of agricultural inputs (seeds, tools) and modern ploughing and harvesting techniques. The objective will be to increase yields and opportunities for small-scale commercial agriculture with a diversity of crops, so that people are less dependent on subsistence and livestock livelihood strategies and less susceptible to impacts of reductions in grazing land; - Vocational skills development: technical training of recent graduates with potential opportunities for recruitment into KIBP operation activities; - Public infrastructure: such as construction of recreational and market facilities, improvements of existing health centres and schools and provision of equipment and furniture. This will have the additional aim of mitigating impact of Scheme-induced influx of jobseekers on the quality and availability of public facilities; and - A commitment that all KIBP businesses will be required to follow, to maintain public access to existing spring wells in their plots, or provide an accessible, alternative source of water for affected villages. The alternatives will be provided prior to development of the allocated land plot for industrial use and restriction of public access. Potential opportunities to partner with local NGOs and Community-Based Organisations (CBOs) with local ties to the LAI villages will be reviewed as a strategy for implementation. Potential annual disbursement budgets will be ringfenced for community investment. The specific community investment activities will be developed through consultation with the LAI villages and affected households about their priorities and needs. The CIP will be aligned with the SEP, community health and safety plan, local recruitment plan and the livelihood components of the LRP. The CIP will include monitoring against clear key performance indicators. Will an annual disbursement budget be established, annual revisions made to the CIP will use monitoring results to feed into the budget allocation process each year. This will be conducted for a period of time to be determined through consultations and discussions between the UIA and relevant stakeholders.	Pre-construction	UIA	Site CESMP, Operational E&S Management System
Labour Management Plan (LMP)	This plan will establish how project workers are to be managed, in accordance with the requirements of national law and international standards. The plan will include job descriptions, base employment conditions, specify training requirements, grievance mechanisms, unionisation, wages, Health and Safety standards and human resources reporting mechanisms.	Provisions of the plan will include but not be limited to the following requirements for all to follow: – Base employment decisions on principles of non-discrimination and equal opportunity, in particular fair and equal pay, especially for women carrying out the same work as men; – Produce job descriptions and provide written contracts and other information that outline the working conditions and terms of employment, including the full range of benefits; – Have worker contracts in place prior to mobilisation of the workforce. Worker contracts shall comply with the International Labour Organisation (ILO) commitments and IFC Performance Standard 2 and include clear statements on working conditions and terms of employment, including overtime arrangements and the timely payment of wages; – Ensure no workers are charged fees to gain Scheme employment; – Inform workers about the grievance mechanism prior to commencement of work. Furthermore, there will be regular refresher awareness raising of the worker grievance mechanism and toolbox talks on workers' rights; Report regularly on key labour performance indicators. This may include (but not limited to): – Number of skilled/unskilled workers recruited per gender and local communities; – Hours worked (regular and overtime) during period and cumulatively, hours lost; – Number and type of accidents, near misses, site audits and meetings, trainings; – Details of any worker grievances; and – Details of any stakeholder grievances in relation to workers or security measures. – Organise a training program and keep training registers for workers; – Provide all workers with a summary declaration of their employment service and training activities at the end of contract as a means to finding continued employment; – Establish occupational health and safety procedures that provide workers with a safe and healthy work environment; – Ensure acceptable conditions of work including by observing national statutory requirements related to minimum wages and hours of work, and meet international standards of not employing any persons under the age of 16 for general work and no persons under the age of 18 for work involving hazardous activities; – Meet international standards related to paying all wages, including bonuses and premium pay for overtime work, in a timely fashion and in a manner consistent with ILO Convention 95; and – Commit to not taking any action to prevent employees from exercising their right of association and their right to organise and bargain collectively.	Pre-construction	Lagan-Dott	Site CESMP, Operational E&S Management System

Plan title	Purpose	Minimum details to be included	Preparation phase	Responsibility	Measures contained in
Workers code of conduct	This plan will provide a minimum standard of conduct that is expected from all workers.	A worker code of conduct will be developed, and all workers employed on the site required to sign it. It will regulate health and safety practices in the workplace and behaviour in local communities to be respected at all times. To mitigate risks of conflict between local host communities and the construction labour force, provisions for behaviour in the local communities will include worker commitments to: – Not block roads or paths in a way that restrict public access, unless this is required for public safety or is authorised by your supervisor; – When traveling by vehicle, abiding by speed limits and traffic laws, and be courteous to local residents. Try to limit noise and dust impact on pedestrians; – When staying in local communities, respecting host and local customs, cultural norms and religious practices and act responsibly. Involvement in drugs, excessive use of alcohol, and prostitution and human trafficking will be avoided; – Respect principles of gender equality and report incidences of gender-based violence (GBV) when encountered; – Be aware of the risk of transmission of HIV/AIDS and sexually transmitted disease; – Report illnesses and make use of Scheme medical support to treat illnesses before they spread; – Avoid unnecessary damage to land, trees, structures, crops, and any property privately owned by people in the local area, and report accidental damage to your supervisor; and – If local residents raise any complaint or concern about the Scheme or conflict with local communities is experienced, immediately report it to your supervisor. Workplace-specific provisions will include worker commitments to: – Participate in all mandatory safety training; – Use appropriate PPE at all times in accordance with training provided on proper use; – Only undertake work for which you are trained, competent and fit; – Follow safety rules and procedures including the use of all relevant standards and instructions; – Demonstrate safe working practices and stop any work that is potentially unsafe; – Help to make sure that other people who work with you – employees, contractors and other third parties – follow the Schemes safety rules and procedures; – Not undertake work when your performance is impaired by illness, alcohol, or any other drug, legal or illegal, prescribed or otherwise; – Not to consume alcohol and drugs, or bring firearms onto site; – Not discriminate against anyone on the grounds of race, colour, religion, political conviction, gender, age, national origin, sexual orientation, marital status or disability. All forms of violence and harassment in the workplace including verbal, physical, sexual, or psychological abuse will be prohibited; and – Exhibit professional behaviour and integrity at all times. In support of the Code of Conduct, the Scheme will deliver awareness briefings to workers on host population norms, traditions and cultural sensitivities with emphasis on respecting local women. They will be conducted on a regular basis including during induction. Induction training and briefings will also be provided on the steps to take if a grievance is raised by an external stakeholder, while posters with the relevant information will be available across the Scheme site.	Pre-construction	Lagan-Dott	Site CESMP
Local Recruitment and Skills Development Plan	Aim to maximise job opportunities for local people, facilitate skills development of the local workforce and provide longer-term benefits to local people beyond the lifetime of the Scheme, therefore enhancing their future employability.	The contractor will commit to utilising local skills from within the LAI to the extent possible. If not available, the recruitment will be extended to the Wider Area of Impact (WAI) comprising the Wakiso and Mukono Districts as secondary catchment areas. The Local Recruitment Plan will aim to maximise job opportunities for local people, facilitate skills development of the local workforce and provide longer-term benefits to local people beyond the lifetime of the Scheme, therefore enhancing their future employability. The Plan will include details on the following aspects: – Means of disclosure of job opportunities to LAI villages (such as through the local village council leaders and job announcements at municipal offices); – Prioritisation of livelihood displacement-affected households in recruitment (and this will be aligned with LRP specifications); – Local employment rate target to be maintained for construction and operations phases; – Process for local people hired on a short-term basis during construction to obtain permanent contracts during the operational phase; and – Provisions to facilitate recruitment and upskilling of women and disabled candidates, and initiatives to encourage women and disabled candidates to apply for Scheme roles. Skills development of local workers will also be detailed in the Plan, focusing on the following aspects: – Identification of skills and labour needs; – Existing skills capacity gaps and training demand analysis; – Tailored skills development programmes in the construction phase, so that local workers are ready to take advantage of operational phase employment opportunities; and – Selection process for participants of skills development programmes. – All on-the-job and technical training will be provided free of charge to workers employed by the contractor or subcontractors.	Pre-construction	UIA with support from Lagan-Dott	Operational E&S Management System
Local Content Strategy	Overarching objective of sharing the project's socioeconomic benefits with the locally affected workers and businesses. It will consider the needs of men and women and where appropriate suggest differentiated measures to help women take up employment opportunities with the project. The	The contractor will commit to encouraging the inclusion of local based companies (defined as those based in the WAI, or Wakiso and Mukono Districts) as well as national companies (based in Uganda) in the procurement of appropriate services and equipment to the extent possible. A local content strategy will be developed and implemented during construction and operations to fulfil this commitment. The strategy will be structured through the following topics: – Local Procurement Opportunities; – Mapping Local Companies;	Pre-construction	UIA	Site CESMP

Plan title	Purpose	Minimum details to be included	Preparation phase	Responsibility	Measures contained in
	strategy will consist of three strands containing policies and actions to promote and maximise opportunities for: Local recruitment policy: to create more employment opportunities for local people. Skills development: to facilitate Livelihood restoration /diversification of displaced people and the improve employability of local people after construction. Local procurement: to provide business opportunities for local small, medium sized enterprises and to stimulate local economic growth.	– Communicating Local Content; – Pre-Qualification of Companies; and – Strategies to Encourage Local Companies to Tender. – Strategies to facilitate local companies' participation in the Scheme supply chain can include: – Unbundling procurement tender requests into smaller work packages; – Providing tender documentation in local languages and free of charge; – Organising longer contract periods to justify acquisition of capital equipment; – Providing longer deadlines to assist small and medium enterprise response; – Waiving or lowering performance bond requirements for local companies; – Using serial contracts or framework agreements; – Setting aside contracts or specific work packages that are only directed to local companies; – Providing price preference as part of the tender evaluation; and – Requesting tenders in local currency. A full range of services from routine products (low profit impact and low sourcing risk) to strategic products (high profit impact and high sourcing risks) will be considered.			
Occupational Health and Safety Plan	Plan to implement a safe working environment, procedures and culture during the construction phase. Further policies / procedures to be developed if need identified through site audits. A separate OHS plan to be developed separately for Scheme operation.	The Scheme will follow legislation and include contract clauses that require contractors to apply international standards related to OHS. Potential infrastructure design flaws will be mitigated through engineering good industry practice, modern and appropriate design and construction method statement use. An OHS Plan will be prepared by Lagan-Dott. The plan will detail the proper use of PPE by all workers and will ensure that PPE use is included in the workers' code of conduct. The plan will set out the contractors appropriately equipped first aid room and that staff are available to address workers' health. The plan will put in place measures to encourage site safety including barriers, signage and sensitisation. The plan will include monitoring and reporting of all accidents, injuries, lost-time incidents, near misses and community interactions on health issues. It will also include preventative measures such as: – Toolbox talks on hygiene and sanitation at least every six months – Good housekeeping on site to prevent pooling of water, to ensure safe and appropriate waste and materials management and vehicle and equipment placement – Control and quality assurance of drinking water – Pest and vector control activities – The plan will provide information dissemination and sensitisation campaigns on venomous snakes directed to workers and provision of additional doses of snake and rabies serum to health facilities on site. It will ensure adequate portable toilets will be provided at all major work sites. Preventive measures for HIV/AIDS will also need to be disclosed to workers through regular briefings. The contractor will be required to provide information and advice about testing and access to treatment and support. It will be the responsibility of the Contractor to source appropriate service providers of HIV/AIDS programming. The implementation of health and safety related plans, procedures and training will allow the Scheme to aim for an accident rate of zero, especially accidents that could result in lost work time, serious injuries and fatalities.	Pre-construction	Lagan-Dott	Site CESMP
Community Health and Safety Plan	This plan will align with Ugandan laws and World Bank ESHS best practice guidelines and will cover at a minimum, site access and traffic management and healthcare management.	A Community Health and Safety Plan will be developed and implemented by the contractor that is aligned with Ugandan laws and WB ESHS best practice guidelines. It will cover but not be limited to the following areas: – Site access: the site will be clearly demarked. External stakeholders will not be allowed to enter areas where blasting, excavations or other activities that are hazardous to public safety are being undertaken. There will be site registry system manned by security personnel and community members will have to sign in and out showing identification; – Traffic: a traffic management plan will be prepared detailing measures to avoid specific local settlements and receptors. It will include speed restrictions through local settlements and avoid construction deliveries on local event days. The plan will include measures to reduce congestion caused by abnormal loads and their escorts and will look to transport and move large loads during night time. The plan will document the use of appropriate warning signs to be placed near construction sites and the training to be provide to drivers; and – Healthcare services and disease control: a community healthcare subplan will be provided to detail formal quarterly (and more frequently, as required) liaison with applicable health authorities to assess Scheme impact on public healthcare services and disease control. The plan will detail onsite medical facilities and first aid room for treating workers onsite, and provisions for treatment of workers residing offsite. Will the applicable municipal councils implement new bylaws to require additional fees for the KIBP such as parking fees for Scheme vehicles, the Scheme will fully comply with them. The Community Health and Safety Plan will be aligned with other community documents such as the Stakeholder Engagement Plan and Community Investment Plan and, other labour plans such as the Occupational Health and Safety Plan, Worker Code of Conduct and the Workers Accommodation Plan.	Pre-construction	Lagan-Dott	Site CESMP
Construction Emergency Preparedness and Response Plan	Preparation of the EPRP is a requirement of IFC PS1 to cover potential emergencies during the construction, operation and decommissioning of the project. The EPRP will form part of the wider suite of plans to be implemented by Lagan-Dott	An Emergency Preparedness and Response Plan (EPRP) will be developed so that the Scheme and relevant third parties (local authorities and emergency services) are prepared to respond to accidental, abnormal, unanticipated and emergency situations in a manner that prevents and mitigates harm to people and the environment. The EPRP will identify accidents and emergency situations and the communities and individuals that may potentially be impacted, such as pedestrians that use roads directly adjacent to the site boundaries or an environmental pollution event. The EPRP will identify response procedures, provision of equipment and resources, designation of responsibilities, communication systems and channels and periodic response training.	Pre-construction	Lagan-Dott	Site CESMP

Plan title	Purpose	Minimum details to be included	Preparation phase	Responsibility	Measures contained in
	(construction) and the Developer's ESHS department (operation).				
Security Management Plan	To ensure that the Scheme protects the health, safety and security of people and communities within the area of influence from any negative impacts related to the project	A Security Management Plan will be developed and implemented by Lagan-Dott that is aligned with the UN Voluntary Principles on Security and Human Rights and the IFC's 2017 Good Practice Handbook 'Use of Security Forces: Assessing and Managing Risks and Impacts'. The objective will be to manage and monitor both the use of public and private security and to safeguard the rights of community members. This plan will include but not be limited to: – Roles and responsibilities, including those of LAI villages local council committees – Procedures to undertake due diligence on private security firms prior to awarding contracts, to check for past claims related to human rights contraventions and past abuses of power by the public, media and police – Hiring requirements for security guards including criminal background checks – Use of force policies and specialised training of security staff in conflict resolution – Firm's internal monitoring and community grievance resolution procedures – Requirements for the types and frequency of training to be provided to guards – Equipment to be provided to guards and management of equipment – Security workers' code of conduct Community members will be encouraged through stakeholder engagement activities to report any human rights contraventions of security personnel through the community grievance mechanism without retribution from public or private security. The security plan will be developed and implemented in consultation with the LAI villages' local councils, to ensure the plan is conceived not just to protect the Scheme from trespassers or theft but to protect the human rights of communities surrounding the site.	Pre-construction	Lagan-Dott and UIA	CESMP and Operational E&S Management System
Influx Management Plan	Avoid and mitigate the effects of project- induced migration in partnership with civil society.	An influx management plan (IMP) will be produced to avoid and mitigate the adverse effects of Scheme-induced migration. This will include consideration of the following measures, to be undertaken in consultation and in partnership with district governments (including community development officers and spatial planners) and civil society organisations: – Ring-fencing community investment funds for spatial planning and to support local initiatives to address greater demand for social and community services and infrastructure. – Holding influx forums every year during construction to bring together stakeholders and service providers to create awareness of influx status, share any monitoring data available, and identify lessons learned. – Supporting counselling services in response to known existing problems to raise awareness and target services to the community, for example in relation to marital relationships, gender-based violence, alcohol and drugs. – Addressing HIV/AIDS prevalence through coordination with the Ugandan Ministry of Health and civil society with activities that are consistent with national policies, treatment guidelines and outreach approaches. The IMP will need to be closely aligned with the community investment plan	Pre-construction	UIA	Construction E&S Management System
Construction Traffic Management Plan	To define the requirements that will be implemented to mitigate any potential negative risks to the environment, workers or the community resulting from construction traffic.	The plan will avoid construction deliveries on local event days and where possible, avoid deliveries during peak hours. Furthermore, the plan will include measures to reduce congestion caused by heavy load times. The plan will document the use of appropriate warning signs to be placed near construction sites and the training to be provide to drivers, as well as vehicle routings during different stages of the construction phasing. The plan will show diversion routes during the flyover construction and delivery vehicle routing during construction. The TMP will advise and inform site contractors and external suppliers of equipment and materials of access and entry points along with other key information such tipping areas and wash-out areas. Intended to complement and work alongside relevant CESMP. The TMP will be classed as "live" and therefore be subjected to updates as required.	Pre-construction	Lagan-Dott	CESMP
Construction Waste Water Management Strategy	To guide the means by which the Developer (during operation) will ensure that the Scheme and its activities do not cause unacceptable contamination or impacts to water resources and that process and potable water meet applicable standards.	This plan will specify measures to avoid contamination or pollution incidents of surface water and groundwater, and specify the implementation of a comprehensive waste water management plan which will include (but not be limited to siltation and oil management, hazardous waste spill management, surface water run off management. On Scheme completion, Lagan-Dott will have to carry out a site clean-up, including removal of all waste material including scrap metal.	Pre-construction	Lagan-Dott	CESMP
Materials Management Plan (MMP)	Identify measures for minimisation of materials to be used on site, their source and transport to ensure safe, sustainable and ethical origins of materials, along with appropriate storage and management.	This will include a bill of quantities detailing types and amounts of construction materials required as well as details of the sourcing of materials and include details of the provider and location of procurement.	Pre-construction	Lagan-Dott	CESMP
Construction Waste Management Plan	Identify measures for minimisation of waste and safe disposal of construction Wastes. To define the requirements and procedures to be followed by Lagan-Dott (construction) and Developer (operation) during the handling and storage of chemicals, lubricants, solvents, oil and fuel throughout the project.	This plan will detail the Site procedures for dealing with construction waste including information on the final disposal site/landfill, measures to reduce the risk of illegal waste dumping, hazardous waste management and disposal and include waste transfer note requirements. Waste monitoring requirements will also be included.	Pre-construction	Lagan-Dott	CESMP
Operational Site Waste Management Strategy (SWMS)	Identify measures for minimisation of waste and safe disposal of operational wastes. To define the requirements and procedures to be followed by Lagan-Dott (construction) and Developer (operation) during the handling and storage of chemicals, lubricants, solvents, oil and fuel throughout the project.	In order to appropriately manage waste arising from the operational development, a waste survey will be undertaken identifying the types of waste arising from each activity across the Scheme, as well as estimated quantities will be issued, identifying a waste handling infrastructure within the site considering the waste hierarchy of reducing re-using and recycling materials and finally waste processing and disposal sites for each waste stream. The SWMS will be included in the ESMP. PEC outlines the SWMS as follows: Three stages of solid waste management are defined:	Pre-construction, and updated prior to Operation to accommodate	UIA with support from Lagan-Dott	Operational E&S Management System

Plan title	Purpose	Minimum details to be included	Preparation phase	Responsibility	Measures contained in
		– Generation, – Collection and transportation; and – Final disposal. In developing a suitable and sustainable solid waste management strategy, the detailed design will consider the following options: - – Source reduction - through engineering process modifications. For example, the company could work with their customers to eliminate the use of particular containers and switch to biodegradable containers. – In-process recycling - develop a separation method to use the waste as a raw material for the same process. For example, the company could collect the metal scrap and attempt to process it again in the same process. – On-site recycling - develop a separation method to use the waste as a raw material for another in-house process. – Off-site recycling - develop a separation method and transport the waste to another organization so that another company could use the waste as a raw material. – Waste treatment to render the waste less hazardous - develop a separation method and treat the waste so it is less harmful before releasing it to the environment. This may involve changing it into liquid and treat it as wastewater. – Secure disposal - dispose of the waste at a secure landfill. – Direct release to the environment - develop a separation method and release the waste directly to the environment; where the solid waste is biodegradable. The above outlined SWMW will be enhanced and developed to increase waste reduction and avoid the risk of inappropriate waste disposal. Provisions will be made for the management of contractor's procedures for dealing with waste on a day to day basis and the SWMS will include information on the final disposal site/landfill: – Operational Waste Management Plan (OWMP) – The Waste Management Strategy mentions lorries will collect the rubbish. What Waste containers will be provided, how will hazardous waste be collected, will it be separated at source etc. – Detail on licenced waste contractors will be included to increase re-use and recycling of materials and to minimise in-appropriate disposal of hazardous waste. – A list of NEMA approved landfills and their location in relation to the Scheme.	any on site changes.		

Table 19.6 Plans and Policies require for pre-operational phase of Scheme

Plan title	Purpose		Preparation phase	Responsibility	Measures contained in
Operational Emergency Preparedness and Response Plan	Preparation of the EPRP is a requirement of IFC PS1 to cover potential emergencies during the construction, operation and decommissioning of the project. The EPRP will form part of the wider suite of plans to be implemented by the UIA's ESHS department.	An Emergency Preparedness and Response Plan (EPRP) will be developed so that the Scheme and relevant third parties (local authorities and emergency services) are prepared to respond to accidental, abnormal, unanticipated and emergency situations in a manner that prevents and mitigates harm to people and the environment. The EPRP will identify accidents and emergency situations and the communities and individuals that may potentially be impacted, such as pedestrians that use roads directly adjacent to the site boundaries or a fire accident on site. The EPRP will identify response procedures, provision of equipment and resources, designation of responsibilities, communication systems and channels and periodic response training.	Pre-Operation	UIA	Operational E&S Management System
Operational Environmental and Social Policy	This policy will be developed for the project and will require all KIBP contractors and businesses to commit to, in recognition of their responsibilities regarding the impact of their business operations on the project Areas of Influence (AoI) in relation to environmental, health and safety and social conditions.	An E&S policy will be developed for the Scheme that all KIBP contractors and businesses must commit to, in recognition of their responsibilities regarding impact of business operations on the Scheme AoI's environmental, health and safety and social conditions. The policy will include an overarching statement of the E&S objectives and principles for the Scheme to follow, including the following provisions: - Comply with all the applicable environmental, health & safety laws, regulations and IFC Performance Standards; - Prioritise health and safety of all personnel including subcontractor personnel; - Conduct business activities in an environmentally and socially responsible manner with full respect of the environment and of the local and regional communities; - Develop and maintain specific and measurable E&S objectives/targets, and appropriate procedures to incorporate and improve upon them; - Avoid over-consumption of energy and natural resources, and minimise the usage of non- renewable resources and the emission of greenhouse gases; - Take all reasonable initiatives to minimise pollution of the environment; and - Establish and maintain appropriate mechanisms for communication and consultation of relevant E&S issues with contractors, sub-contractors and external stakeholders. The policy will include a commitment for all businesses to maintain public access to existing /wells in their plots, or provide an accessible, alternative source of water for affected villages. The alternatives will be provided prior to development of the allocated land plot for industrial use and restriction of public access. This policy will be disclosed to all contractor, subcontractor and service provider workers and other stakeholders, and made available upon request.	Pre-Operation	UIA	Operational E&S Management System

Plan title	Purpose		Preparation phase	Responsibility	Measures contained in
Operational Human Resources Policy	Equity in local employment benefits / minimise social conflict. Prohibit the use of child and forced labour / promote non-discrimination and equal opportunities. Special measures to promote equal employment opportunities across ethnicities and women.	A Scheme-specific Human Resources (HR) policy will be developed by the Scheme UIA, and all subcontractors required to apply it and provide it to workers. The main objective will be to ensure efficient and fair management of workers in compliance with requirements of Ugandan labour laws and international good labour practice. It will include policy statements relating to the following topics: 1. Working conditions and management of worker relationships: – HR policy; – Working relationship; – Working conditions & terms of employment, including working hours, wages, leave and benefits; – Workers' organizations, freedom of association and collective bargaining; – Non-discrimination & equal opportunity; – Retrenchment; and – Grievance mechanism. 2. Protecting the workforce through prohibition of: – Child labour; – Forced labour; and – Harassment and abuse. – Occupational health & safety; – Workers engaged by third parties; and – Supply chain.	Pre-Operation	UIA	Operational E&S Management System
Retrenchment Plan	A retrenchment/demobilisation plan will be required to anticipate any significant job losses resulting from the projects transition from construction to operation.	The contractor will develop a retrenchment /demobilisation plan one year before the start of operations, to anticipate any significant job losses resulting from the Scheme's transition from construction to operation. The plan will be prepared and implemented in line with national law and good industry practice and based on the principles of non-discrimination and will reflect consultation with workers and appropriate governmental agencies if applicable. This plan will include: – The reasons why job losses are necessary; – The timescale and when notice of employment contract end will be given; – What jobs are likely to be maintained during the operation phase and how best employees will be selected for the transition construction operation; – How broader community impact issues are to be addressed; and Consultation process proposed with the workforce and the local authorities.	1 year prior to operation	UIA	Operational E&S Management System
Operational Traffic Management Plan		This plan will detail the operation and frequency of the public and worker shuttle, safety measures such as speed limits, operating hours to reduce noise and air pollution to residents within the site. The Plan will be regularly reviewed to consider changes in the transport situation (e.g. passenger rail services, where implemented).	Pre-Operation	UIA	Operational E&S Management System
Stakeholder Engagement Plan (SEP)	This plan will describe the means by which the Scheme will ensure continuous engagement with affected people and other interested parties.	This plan will be designed to manage stakeholder and community relations, expectation, and grievances through consultation and disclosure mechanisms, based on the principles of respectful and meaningful dialogue. This document will shape the engagement with the most vulnerable local populations throughout the lifetime of the Scheme and will be updated when there are significant changes to the project, such as change in phase or identification of new stakeholders.	Completed, and will be updated as required throughout the lifetime of the Scheme	UIA	Site CESMP, Operational E&S Management System

19.5 Monitoring and reporting requirements

Effective reporting is essential for rendering an ESMP of practical value. Routine independent auditing provides the necessary impetus for continual improvement. Without these two fundamental elements, such systems simply become data collecting exercises. Performance monitoring, reporting and auditing will be carried out to ensure compliance with the requirements of this ESIA and ESMP. The following provides an outline approach which is aligned to the requirements of ISO 14001. The final scope and format of all reports proposed herein will be agreed with the lender prior to them being required and produced.

19.5.1 Lagan-Dott internal reports

It is recommended that Lagan-Dott undertakes on a daily basis, compliance monitoring of the construction sub-contractors environmental and social activities. This will be carried out as per the approved Lagan-Dott CESMP. Lagan-Dott environment officer will be required to prepare a monthly report for issue to the UIA's ESHS director. These reports will normally be no more than one or two pages in length, to summarise the following:

- Progress in implementing the CESMP and sub-management plans
- Findings of the monitoring programmes, with emphasis on any breaches of the control standards, action levels or standards of general site management
- Outstanding non-compliance reports (NCRs) and their proposed close out dates
- Summary of any complaints by external bodies and actions taken/to be taken
- Relevant changes or possible changes in legislation, regulations and international practices.
- Any breaches of the acceptable standards specified by law/construction permits and/or the CESMP will be reported to the UIA, using a NCR Form. Lagan-Dott will promptly address and/or correct any NCRs, informing the UIA upon completion.

19.5.2 UIAs monitoring of construction activities

The UIA will undertake weekly compliance monitoring of Lagan-Dott's environmental and social activities. This will be carried out as per the approved CESMP. Internal audits will be undertaken within two months of commencement of construction and thereafter every three months focussing on the performance of the implementation of the CESMP and its subplans. The UIA will also audit the workers' accommodation camps on a bi monthly basis. Any breaches of the acceptable standards specified by law/construction permits and/or this CESMP identified through UIA monitoring of Lagan-Dott will be reported using an NCR Form.

A copy of each completed NCR will be held on file by the UIA's ESHS department, to be replaced by the final copy when it is received. A record of corrective actions will also be made and tracked to their completion. Outstanding NCR's will be followed up and completion incentivised using fines for exceeding agreed completion timeframes.

19.5.3 UIA monitoring of operation activities

A register of all necessary external stakeholder, including regulatory reporting requirements will be listed within the Operational E&S Management Plan. The frequency of reporting, format and minimum content along with the person responsible will be contained in the register.

The UIA will ensure that all the necessary reports are produced and submitted in a timely fashion in order to achieve on-going regulatory compliance throughout the life of the Scheme.

19.5.4 Independent auditing

The IFC PS guidance notes state that projects require an independent environmental and/or a social expert to verify project monitoring information. This will also be a requirement of the certified ESMS. During the construction phase and as a minimum, throughout the first three years of operation, arrangements will be made by the UIA for an industrial environmental and social management specialist to carry out an independent annual audit of the existing practices against the requirements of the ESMP. The key objectives of the audit will be as follows:

- The practical implementation of the ESMP and progress since the last visit
- Feasible improvement objectives for completion before the next visit.

These audits will be used to re-examine the continued appropriateness of the ESMP and to provide advice on any up-dates required. Attention will be given to lessons learned in the light of experience. In particular, consideration will be given to the monitoring programmes in place to determine whether their purpose has been served and they can therefore be terminated or reduced in frequency.

Audit of social issues will be important, especially with regards to worker management, workers' terms and conditions, occupational health and safety, and grievances. An external audit will need to verify that the Scheme commitments to worker's rights are implemented, in particular with regards to:

- Use of child labour
- Payment of minimum wages and overtime
- Not taking any action to prevent employees from exercising their right of association and
- their right to organise and bargain collectively
- Ensuring no workers are charged fees to gain employment on the Scheme
- Implementation of plans, procedures and training for occupational health and safety
- Non-discrimination and equal opportunity
- Use of the labour grievance mechanism
- The existence of human resource policies, job descriptions, written contracts
- Provision of information to labour force regarding rights and working conditions
- Sufficiency of employee training activities

Annual audit reports of the independent advisor will be made available for public disclosure on the Scheme and Lenders website.

20. References

Avert. 2017. HIV and AIDS in Uganda. [online] Available at: https://www.avert.org/professionals/hiv-around-world/sub-saharan-africa/uganda

Banage W.B. 1999. Namanve Industrial and Business Park: An Ecological and Environment Study. Draft Report. Kampala. (Unpublished report).

Bills Supplement. The National Environment Bill, 2017 accessed on 3 April 2019 from https://nema.go.ug/sites/default/files/NEMA%20Bill%202017%20latest%2024%20Nov%202017.pdf

BIMCO Consult Ltd. 2016. Environmental and Social Impact Assessment Report of the proposed Namanve Complex for Hima Cement Limited.

BioNET, 2019a. BioNET -EAFRINET Keys and Fact Sheets: *Mimosa pigra.* Available at: <https://keys.lucidcentral.org/keys/v3/eafrinet/weeds/key/weeds/Media/Html/Mimosa_pigra_(Giant_Sensitive_Plant).htm#References> [Accessed on 24 May 2019].

BioNET, 2019b. BioNET -EAFRINET Keys and Fact Sheets: *Broussonetia papyrifera.* Available at: <https://keys.lucidcentral.org/keys/v3/eafrinet/weeds/key/weeds/Media/Html/Broussonetia_papyrifera_(Paper_Mulberry).htm> [Accessed on 24 May 2019].

BioNET, 2019c. BioNET -EAFRINET Keys and Fact Sheets: *Lantana camara*. Available at: https://keys.lucidcentral.org/keys/v3/eafrinet/weeds/key/weeds/Media/Html/Lantana_camara_(Lantana).htm [Accessed on 24 May 2019].

BirdLife International 2016. *Balearica regulorum*. The IUCN Red List of Threatened Species 2016: e.T22692046A93334893. Available at: <http://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T22692046A93334893.en.> [Accessed on 22 May 2019].

BirdLife International 2017a. *Acrocephalus griseldis* (amended version of 2017 assessment). The IUCN Red List of Threatened Species 2017: e.T22714757A118739069. Available at: <http://dx.doi.org/10.2305/IUCN.UK.2017-3.RLTS.T22714757A118739069.en.> [Accessed on 22 May 2019].

BirdLife International 2017b. *Calamonastides gracilirostris* (amended version of 2016 assessment). The IUCN Red List of Threatened Species 2017: e.T103779235A111170261. Available at: <http://dx.doi.org/10.2305/IUCN.UK.2017-1.RLTS.T103779235A111170261.en.>[Accessed on 22 May 2019].

BirdLife International 2019. Species factsheet: Anastomus lamelligerus. Available at: <http://www.birdlife.org> [Accessed on 22 May 2019].

BirdLife International, 2018. *Anastomus lamelligerus*. The IUCN Red List of Threatened Species 2018: e.T22697664A132274733. Available at: <http://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T22697664A132274733.en> [Accessed on 22 May 2019].

British Standard (BS) 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise'

Carswell. M, Pomeroy. D, Reynolds, J & Tushabe. H, 2005. Bird Atlas of Uganda. British Ornithologists' Club. Department of Zoology, University of Oxford.

Central Region Census. 2014. Uganda National Household Survey and National Population and Housing Census.

Consult Limited. 2008. Environment and Social Impact Assessment (ESIA) for the earthworks in the Kampala Industrial and Business Park (KIBP).

Convention on Biological Diversity (CBD) Secretariat. 2019. Grenada - Country Profile. Available at: < https://www.cbd.int/countries/?country=ug > [Accessed on 22 May 2019].

Daily Monitor. 2013. Bukasa inland port survey scheduled for next month. Available at: https://www.monitor.co.ug/Business/Prosper/Bukasa-inland-port-survey-scheduled-for-next-month/688616-1704142-item-00-na68s1z/index.html (last accessed 06/06/2019).

Daily Monitor. 2016. Minority ethnic groups battle to preserve their heritage. [online] Available at: https://www.monitor.co.ug/Magazines/PeoplePower/Minority-ethnic-groups-battle-to-preserve-their-heritage/689844-3203168-si57p5/index.html

Daily Monitor. 2017. Crime against women, children on rise – report. [online] Available at: https://mobile.monitor.co.ug/News/Crime-against-women--children-on-rise---report/2466686-3833756-format-xhtml-139r0cuz/index.html

Daily Monitor. 2019. NEMA okays Kampala port construction. Available at: https://www.monitor.co.ug/News/National/Nema-okays-Kampala-port-construction/688334-4997752-opjkdu/index.html (last accessed 06/06/2019).

European Union. 2007. The Pre-Feasibility Study for Strengthening and Improvement of Sections of the Northern Corridor Route (Malaba – Kampala – Katuna) EU Framework Contract. July 2007

Eurostat. 2018. Accidents at work statistics. [online] Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php/Accidents_at_work_statistics

Feilong Investments Ltd. 2018. Environmental Impact Assessment. For the proposed plastic manufacturing industry in Nantabulirwa village, Nantabulirwa parish, Goma division, Mukono district.

FOl Logistics (U) Limited. 2016. Environmental Impact Statement for the proposed rice milling plant on plot 896, block 113 in Kampala Business & Industrial Park – Namanve, in Kolo – Buwanyi village, Nantabulirwa parish, Goma division, Mukono municipality, Mukono district.

Food and Agriculture Organisation of the United Nations. N.D. Gender and Land Rights Database – Uganda. [online] Available at: http://www.fao.org/gender-landrights-database/country-profiles/countries-list/land-tenure-and-related-institutions/prevailing-systems-of-land-tenure/en/?country_iso3=UGA

Foundation for Human Rights Initiative (FHRI). N.D. Recognize and protect the rights of Indigenous Minority Groups in Uganda. [online] Available at: https://www.fhri.or.ug/index.php/pages/whats-new/item/212-recognize-and-protect-the-rights-of-indigenous-minority-groups-in-uganda

GIBB (Eastern Africa) Ltd, 2002. Environmental Impact Assessment study of Namanve Industrial and Business Park.

GIBB 2002. Environmental Assessment Study of Namanve Industrial and Business Park. Final report for the Uganda Investment Authority (Unpublished report).

Greenhouse Gas Protocol. 2019. Calculation Tools [online] Available at: https://ghgprotocol.org/calculation-tools#cross_sector_tools_id [Accessed 7 Jun. 2019].

Greenhouse Gas Protocol. 2019. *FAQ*. [online] Available at: https://ghgprotocol.org/sites/default/files/standards_supporting/FAQ.pdf [Accessed 7 Jun. 2019].

HEBOCO, Consult Ltd. 2017. Environmental Impact Statement. For the proposed cooking oil and washing soap manufacturing plants to be located on plot 655, block 113, in the South C Sector, in the Kampala Industrial and Business Park – Namanve, in Kolo - Buwanyi village, Nantabulirwa parish, Goma division, Mukono municipality, Mukono district

Human Rights Awareness and Promotion Forum. 2016. Legal Regulation of Sex Work in Uganda: Exploring the Current Trends and Their Impacts on The Human Rights Of Sex Workers. [online] Available at: https://hrapf.org/images/researchpapers/161228legalregulationofsexworkersinugandastudy_updated-1.pdf

Human Rights Council by Minority Rights Group International. 2011. Ethnic Minorities in Uganda: Universal Periodic Review Joint Submissions for Uganda. [online] Available at: https://lib.ohchr.org/HRBodies/UPR/Documents/session12/UG/JS6-JointSubmission6-eng.pdf

Institute of Air Quality Management (IAQM), Guidance on the assessment of dust from demolition and construction, February 2014.

Integrated Biodiversity Assessment Tool (IBAT). 2019. Integrated Biodiversity Assessment Tool 2008-2019. Available at: <https://www.ibat-alliance.org>[Accessed on 24 May 2019].

International Finance Corporation. 2012a. Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. International Finance Corporation, World Bank Group.

International Finance Corporation. 2012b. Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. International Finance Corporation, World Bank Group.

International Finance Corporation. 2012c. Performance Standard 3: Resource Efficiency and Pollution Prevention. International Finance Corporation, World Bank Group.

Irumba, R., 2014. Spatial analysis of construction accidents in Kampala, Uganda. *Safety Science*, *64*, pp.109-120.

ISO 9613-2 - Attenuation of sound during propagation outdoors - Part 2: General method of calculation

IUCN SSC. 2016. Antelope Specialist Group 2016. *Tragelaphus spekii* (errata version published in 2017). The IUCN Red List of Threatened Species 2016: e.T22050A115164901. Available at: <http://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T22050A50195827.en.> [Accessed on 24 May 2019].

IUCN, 2019b. 100 of the world's worst invasive alien species : a selection from the Global Invasive Species Database. Available at: https://www.iucn.org/content/100-worlds-worst-invasive-alien-species-a-selection-global-invasive-species-database [Accessed on 24 May 2019].

IUCN. 2019. The IUCN Red List of Threatened Species. Version 2018-2. Available at: <http://www.iucnredlist.org> ISSN 2307-8235 [Accessed on 22 May 2019].

Kampala City Air accessed on 3 April 2019 from http://mappingforchange.org.uk/2019/01/kampala-city-air/

Kansiime, F., Nalubega, M., Tukahirwa, E.M. and Bugenyi, F.W.B., 1994. The potential of Nakivubo swamp (papyrus wetland) in maintaining water quality of inner Murchison bay-Lake Victoria. *African Journal of Tropical Hydrobiology and Fisheries*, *5*(2), pp.79-87.

Kansiime, F., Kateyo, E. and Okot-Okumu, J., 1995. Effects of pollution on Inner Murchison bay (Lake Victoria-Uganda) on the distribution and abundance of plankton. *A report of makerere institute of environment and natural resources*.

Kirenga, BJ et al, The State of Ambient Air Quality in Two Ugandan Cities: A Pilot Cross-Sectional Spatial Assessment July 2015

Lagan/DOTT Joint Venture. Kampala Industrial and Business Park, Namanve. Form C4.1.10 Method Statement.

Land Links. N.D. Country Profile – Uganda. [online] Available at: https://www.land-links.org/country-profile/uganda/

Landsberg, F., Treweek, J., Stickler, M.M., Henninger, N. and Venn, O., 2013. Weaving ecosystem services into impact assessment. *A Step-By-Step Method, Version*, *1*, p.34.

Ministry of Water and Environment. 2014. Uganda Second National Communication to the United Nations Framework Convention on Climate Change. [online] Available at: https://unfccc.int/sites/default/files/resource/uganc2.pdf

Ministry of Water and Environment. 2015. Uganda National Climate Change Policy. Available at: https://www.mwe.go.ug/sites/default/files/library/National%20Climate%20Change%20Policy%20April%202015%20final.pdf [Accessed 2 Jun. 2019].

Ministry of Water and Environment. 2015. Uganda's Intended Nationally Determined Contribution (INDC). Available at: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Uganda%20First/INDC%20Uganda%20final%20%2014%20October%20%202015.pdf [Accessed 7 Jun. 2019].

Minority Rights Group International. 2001. Uganda: The Marginalization of Minorities. An MRG International Report. [online] Available at: https://minorityrights.org/wp-content/uploads/old-site-downloads/download-143-Uganda-The-Marginalization-of-Minorities.pdf

Mukono District Local Government. 2014. National Population and Housing Census 2014, Area Specific Profiles: Mukono District. [online] Available at: https://www.mukono.go.ug/publications/national-population-and-housing-census-2014-area-specific-profiles-mukono-district

National Environment Act. 1995. Uganda Legal Information Institute. Available at: https://ulii.org/ug/legislation/consolidated-act/153 [Accessed 7 Jun. 2019].

NEMA. 1998. The Environmental Impact Assessment Regulation. [online] Available at: https://nema.go.ug/sites/all/themes/nema/docs/eia_egulations.pdf

New Vision. 2016. Malaria leading cause of death in Uganda. [online] Available at: http://www.newvision.co.ug/new_vision/news/1423973/malaria-leading-cause-death-uganda

Office of the Auditor General. 2016. Enforcement Of Occupational Safety And Health Activities At Workplaces By The Department Of Occupational Safety And Health Under The Ministry Of Gender Labour And Social Development. [online] Available at: http://www.oag.go.ug/wp-content/uploads/2017/04/Enforcement-of-Occupational-Safety-Health-OSH-at-workplaces-by-DOSH.pdf

Okalebo, J.R., Gathua, K.W. and Woomer, P.L., 2002. Laboratory methods of soil and plant analysis. *A working manual*, *2*, pp.29-68.

Pallister, J.W., 1959. *The geology of southern Mengo*. Government Printer, South Africa.

Stevenson. T & Fanshawe. J, 2002. The Birds of East Africa. Kenya, Tanzania, Uganda, Rwanda, Burundi. T & AD Poyser London.

The National Environmental Act, Cap 153 accessed on 3 April 2019 from https://nema.go.ug/sites/all/themes/nema/docs/national_environment_act.pdf

The Plant List, 2019. Available at: <http://www.theplantlist.org/> [Accessed on 22 May 2019].

Uganda AIDS Commission. 2017. Uganda HIV/AIDS Country Progress Report July 2016-June 2017. [online] Available at: https://www.unaids.org/sites/default/files/country/documents/UGA_2018_countryreport.pdf

Uganda Bureau of Statistics. 2016. The National Population and Housing Census 2014 – Sub-County Report. Kampala, Uganda. [online] Available at: https://www.ubos.org/onlinefiles/uploads/ubos/census_2014_regional_reports/Census_2014_Report_Central_Region.pdf

Uganda Bureau of Statistics. 2018. [online] Available at: https://www.ubos.org/explore-statistics/statistical-datasets/220/

Uganda Human Rights Commission. N.D. Workers' Rights: A perspective on the environment of the rights of factory workers in Uganda. [online] Available at: http://uhrc.ug/system/files_force/ulrc_resources/WORKERS%20RIGHTS.pdf

Uganda National Household Survey 2016/17. [online] Available at: https://www.ubos.org/onlinefiles/uploads/ubos/pdf%20documents/UNHS_VI_2017_Version_I_%2027th_September_2017.pdf

Uganda Police. 2017. Annual Crime Report. [online] Available at: https://www.upf.go.ug/wp-content/uploads/2018/07/ANNUAL-CRIME-REPORT-2017.pdf

Uganda Radio Network. 2017. Insider Job Crime Major Challenge at Namanve Park – Police. [online] Available at: https://ugandaradionetwork.net/story/insider-job-crime-major-challenge-at-namanve-park-police

UNIDO and UNCTAD 1998. Pre-feasibility study and preliminary design proposal for Namanve Industrial Park. Final report for the Uganda Investment Authority (Unpublished report).

United Kingdom Highways Agency, Design Manual for Roads and Bridge (DMRB), May 2007.

United Nations Economic Commission For Africa. 2018. Road Safety Performance Review Uganda. [online] Available at: www.unece.org/fileadmin/DAM/road_Safety/Documents/RSPR_Uganda_February_2018/Uganda_Road_Safety_Performance_Review_Report_web_version.pdf

Van Perlo, B, (1955). Birds of Eastern Africa. Princeton University Press

Vermeiren, Karolien & Van Rompaey, Anton & Loopmans, Maarten & Eria, Serwajja & Paul, Mukwaya. 2012. Urban growth of Kampala, Uganda: Pattern analysis and scenario development. Landscape and Urban Planning. 106. 199-206.

Wildlife Conservation Society (WCS), 2016. Nationally Threatened Species for Uganda. National Red List for Uganda for the following Taxa: Mammals, Birds, Reptiles, Amphibians, Butterflies, Dragonflies and Vascular Plants.

Williams, J. G. and Arlott. N, (1980). A Field Guide to the Birds of East Africa. Collins/London 415p.

World Bank. 2014. Understanding children's work and youth employment outcomes in Uganda. UGANDA INTER-AGENCY COUNTRY REPORT. [online] Available at: http://documents.worldbank.org/curated/en/103571468194955640/pdf/103603-WP-v1-PUBLIC-REVISED-add-series-SEE-Uganda-Excecutive-summary-child-labor-youth-emp20141016-155128.pdf

World Bank. N.D. Life expectancy at birth, female (years). [online] Available at: https://data.worldbank.org/indicator/SP.DYN.LE00.FE.IN

World Health Organisation. 2016. Country Cooperation Strategy At a Glance – Uganda. [online] Available at: https://apps.who.int/iris/bitstream/handle/10665/136975/ccsbrief_uga_en.pdf;jsessionid=62B1CAD6664677A31DB2252DB577DF0F?sequence=1

World Wildlife Fund (WWF), 2019. Biodiversity and Ecosystems in Uganda. Available at: <http://wwf.panda.org/wwf_offices/uganda/>[Accessed on 22 May 2019].

Zimmerman. D. A, Turner. D. A, Pearson. D. J, Willis. I, Douglas Pratt. H. (1996). Birds of Kenya and Northern Tanzania. Princeton University Press; Field Guide edition.

Queensland.Leeds@engineer.com