EXECUTIVE SUMMARY

Introduction

The East African Crude Oil Pipeline (EACOP) System is a planned export pipeline project that will transport oil from an inlet flange at the Kabaale pumping station (PS1), in Hoima district, Uganda, to an export flange at a proposed marine storage terminal (MST) at Chongoleani, Tanga district, on the East African coast of Tanzania. The Uganda National Oil Company (UNOC) and the Tanzania Petroleum Development Corporation (TPDC) will be shareholders in a pipeline company with Total E&P, Uganda B.V. (TEPU), Tullow Uganda Operations Pty Ltd (TUOP) and CNOOC Uganda Limited (CUL) that will develop, construct and operate the pipeline. Total East Africa Midstream (TEAM) BV is the developer of the project.

This environmental impact statement (EIS) is a report of the environmental and social impact assessment conducted to identify, describe and assess the likely interactions of the portion of the EACOP project in Uganda with environmental and socio-economic receptors, termed as “valued environmental and social components” (VECs).

This ESIA has been prepared pursuant to the Government of Uganda Environmental Impact Assessment Regulations (1998) and conducted in accordance with the Scoping Report and terms of reference approved by NEMA, dated 19 September 2017.

Project Description

In Uganda, the EACOP project comprises the following components:

- 296 km of insulated, electrical heat-traced, buried 24” pipeline
- aboveground installations (AGI):
    - two pumping stations (PS) (PS1 and PS2)
    - 19 intermediate block valves (15 standalone, and four co-located with electric substations) and electric heat trace substations
- roads:
    - new and upgraded permanent access roads
    - new and upgraded construction facility access roads
- construction facilities:
    - four main camps and pipe yards (MCPY1 through to MCPY4).

The EACOP project in Uganda is shown in Figure ES1.

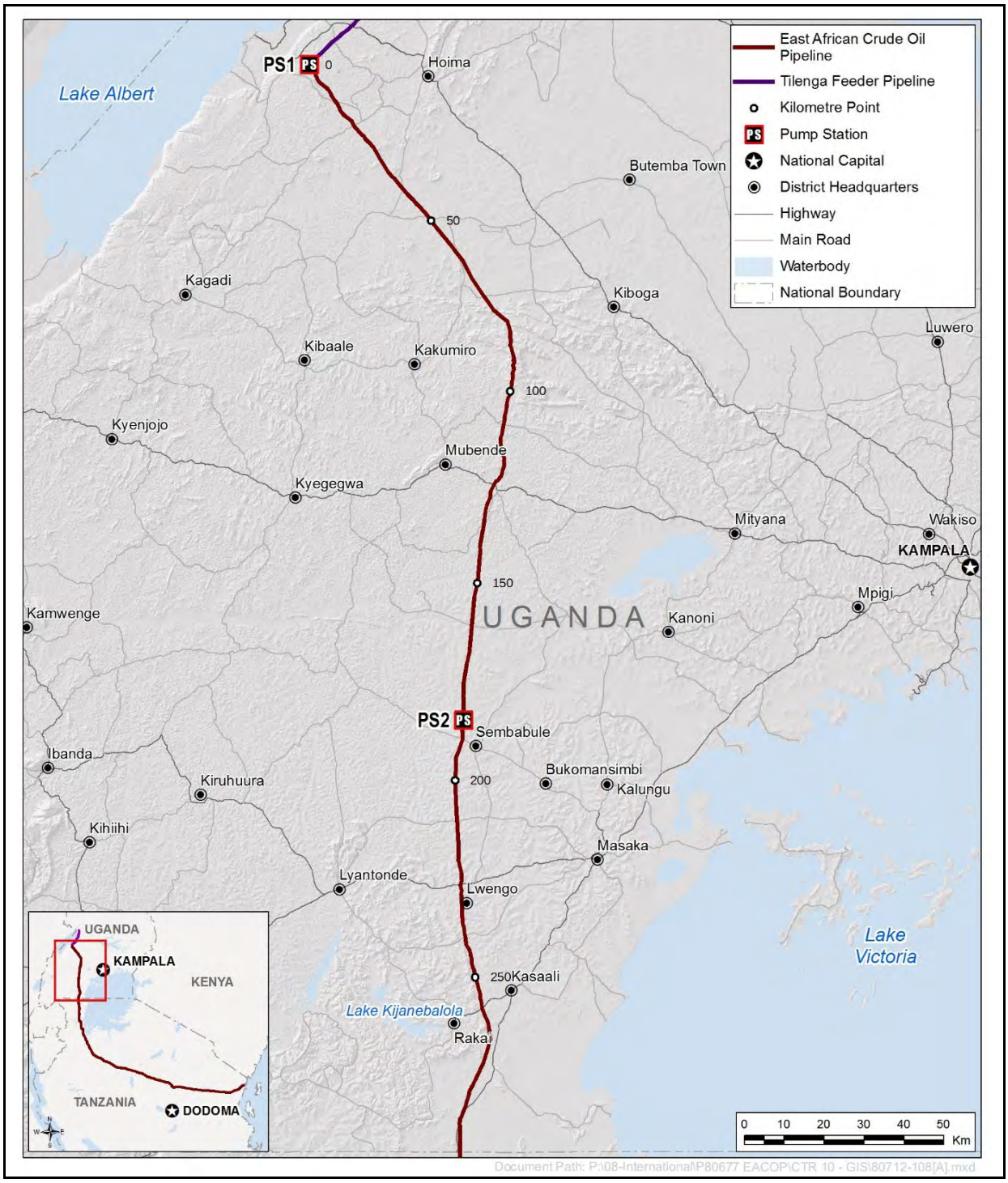

Figure ES1 EACOP Project

The export pipeline originates at the PS1 located at the future Kabaale Industrial Park, in Hoima district. Initially, it crosses relatively low terrain with undulating topography characterised by widespread cropland, settlement and transport infrastructure between Hoima and Mubende districts. The RoW also traverses gently undulating grass and farmland, hills with open plateaus, open grassland, wetlands in Gomba and Ssembabule districts and a relatively flat land scape towards Mutukula near the border with Tanzania.

In Hoima district, the corridor passes in between Wambabya and Bugoma Forest Reserves, and traverses through a modified section of Taala Forest Reserve in Kyankwanzi district, and crosses near the eastern border of Kasana-Kasambya Forest Reserve in Mubende district. There are watercourse crossings including the Kafu River between Hoima and Kakumiro districts, Nabakazi River between Mubende and Gomba districts, Katonga River between Gomba and Ssembabule districts, and Kibale and Jemakunya Rivers in Kyotera district.

On the approach to the Tanzania border, and the north-western corner of Lake Victoria, the corridor crosses a substantial zone of wetlands in a high average rainfall zone that is also characterised by almost unbroken crop land, a substantial proportion of which is under rice cultivation, cattle grazing land and settlement for approximately 90 km. The main alignment broadly follows a ridgeline that defines a watershed for the many watercourses and wetlands as part of the Victoria basin. The corridor nearly clips an abandoned airfield in Kyotera district as well as the former Sango Bay refugee camp close to the Tanzania border. The corridor avoids the large local settlement of Mutukula at the border as it progresses into Tanzania.

Project Alternatives

Project alternatives have been considered for:

- pipeline routing
- siting facilities
    - AGIs
    - construction facilities
- technology
- construction techniques.

Routing

Several alternative pipeline routes were identified during the early stage of the development of the EACOP Project.

The routing process began with the identification of starting point and a flexible end point which was then followed by numerous screening studies to evaluate environmental, social, geo-hazards, constructability and terrain (river crossings and slopes) constraints for pipeline routing at a broad scale. This work culminated in the selection of eleven 50-km-wide corridor combinations for more detailed evaluation. Secondary information was then used to assess the potential corridors using a geographical information system (GIS) and three corridor options were selected:

- Kenya North
- Kenya South
- Tanzania.

Using higher-resolution satellite imagery, the corridors were refined through further analysis of the constraints noted above. Following this work, the Government of Uganda announced the selected Uganda-Tanzania route in April 2016.

Facility Siting

Alternatives were assessed for the number, location, layout and footprint of the following surface facilities:

- AGIs
- construction facilities including MCPYs.

The functional requirements of the surface facilities have been the main driver for the identification, screening and final location selection.

AGIs

The selection of appropriate sites for the PS's was determined before front end engineering design (FEED) by pipeline hydraulic studies. Other criteria considered were:

- thermal design requirements
- safety and environmental risk factors
- site physical conditions (topography, accessibility, proximity to existing infrastructure)
- environmental and social constraints.

Satellite imagery and site visits were used to establish locations during FEED. Siting of the heat trace substations is ongoing and will be refined based on further electrical studies, whereas the block valve locations have been defined based on detailed technological risk analysis.

Construction Facilities

The construction facilities site selection process has taken into consideration the requirement to:

- minimise land acquisition
- minimise distance from existing road networks
- avoid populated areas and nationally protected areas of biodiversity value
- take cognisance of the terrain type and topography suitability.

Technology

Technology alternatives for the following were considered:

- pipeline (diameter and wall thickness)
- pumps
- power generation
- insulation
- heating.

Pipeline

A partially above ground pipeline alternative was considered during early stages of project development but was discounted for numerous reasons including issues associated with security and safety, risk of interference by third parties, permanent land take, visual impacts

and impacts to large wildlife movement. The concept selected for study was a trenched and buried pipeline.

Due to the oil characteristics two strategies were considered to enhance oil flow:

- a cold transport option requiring the partial removal of paraffinic components ensuring that gelling of the oil is prevented. This requires some oil processing and is extremely expensive. Consequently, this alternative was screened out.
- a hot transport option aimed at maintaining the fluid temperature above 50°C with the use of thermal insulation, and a combination of heating options. Hot transport was selected as the base case for further study.

Pumps

The pump technology selection has been determined by the characteristics of the Albertine Graben fluid (viscous with no gas volume fraction) which means that volumetric pump types are not viable. Therefore, centrifugal pumps are considered to be the most suitable design for the fluid type because they are proven technology, robust, and cost effective.

Insulation

Early studies concluded that heat losses with un-insulated pipe would require 35 separate crude fired heating stations resulting in high crude consumption by the heaters, a larger project footprint, larger environmental and social impacts and higher operational costs. By applying thermal insulation on the pipeline it was concluded that the heating requirements could be optimised with power for heating being provided from six stations with lower crude consumption, lower project footprint, less requirement for facilities and with a higher initial cost, but more economical over the lifetime of the project.

Three types of insulation were considered:

- polyurethane foam (PUF)
- glass
- pipe in pipe (PiP).

PUF was selected as the base case as it offers the highest thermal efficiency with lowest capital expenditure (Capex).

Heating

Three heating configurations were considered:

- Case 1 – electric heat tracing (EHT) only case
- Case 2 – bulk heating (BH) only
- Case 3 - EHT + BH (mixed heating architecture).

Case 3 was selected on the basis of higher efficiency compared to Case 1 and the large heat loss associated with Case 2.

Construction Techniques

Several aspects of pipeline construction techniques have been considered for general pipeline construction and for crossings of watercourses and infrastructure:

- open cut
- horizontal directional drill (HDD)
- micro tunnel
- auger bore.

For tarmac roads and railways, the auger boring technique will be used to prevent disruption to services. Other techniques such as direct pipe and micro-tunnelling were discounted during FEED due to the requirement for a much larger construction footprint and greater Capex.

Legislative, Policy and Administrative Framework

The ESIA was developed in accordance with the relevant legislation, policy, plans and regulations, including:

- the National Environment Act, Cap 153, 1995
- the National Environment (Environmental Impact Assessment) Regulations,1998
- the Guidelines for Environmental Impact Assessment in Uganda, 1997
- the Environmental Impact Assessment Guidelines for the Energy Sector in Uganda, 2004 and the Environmental and Social Impact Assessment Guidelines for the Energy Sector in Uganda, 2014.

The ESIA will be submitted to the National Environment Management Authority (NEMA).

The ESIA has also been developed in compliance with the International Finance Corporation Performance Standards (IFC) (2012).

Project standards have been developed for air emissions, emissions to water and noise, taking into consideration the requirements of national legislation and international best practice.

Considering the transboundary nature of the project, the Governments of Uganda and Tanzania signed an intergovernmental agreement (IGA) with the aim of streamlining the legal regime for the EACOP across the two countries. Respective host government agreements (HGAs) will operationalise the IGA.

ESIA Methodology

ESIA Process

The ESIA has included the following steps:

- Screening of potential project impacts was undertaken early in the development of the project, primarily through routing studies
- A scoping exercise to identify potentially significant impacts for taking forward as the focus for the further impact assessment phase, identify data availability and gaps,

determine the spatial scope (area of influence, AOI) and temporal scope for the assessment and define baseline studies
- Baseline studies (desk-based analysis and field surveys) to obtain sufficient information to characterise the environmental and social conditions
- Identification of project impacts and development of mitigation measures iteratively with the project planning and design (the process will continue through the construction phase). Project-only and potential cumulative impacts with other projects have been considered
- Collation of the mitigation and management measures into an environmental and social management plan (ESMP).

Stakeholder engagement has been undertaken throughout the ESIA process and results have been used to inform the ESIA.

Valued Environmental and Social Components

Environmental and social features and receptors assessed in this ESIA are referred to as valued environmental and social components (VECs). Project and cumulative impacts on VECs and their associated ecosystem services are assessed in this ESIA.

VECs are valued and have high sensitivity to project interactions by definition. For VECs that exhibit gradations of sensitivity, a ranking system has been used to describe their sensitivity. VECs with standards and thresholds, for example, air quality, compliance to the standard or threshold have also been used to establish magnitude or to inform impact significance directly.

Impact Assessment

The ESIA systematically identifies, describes and assesses the potential impacts from the EACOP project on VECs.

Normal Operations

The assessment of impacts from normal project operations considered:

- generic and location specific project impacts
- cumulative impacts
- transboundary impacts.

Impacts were considered before mitigation was applied and after mitigation was applied. The development of measures to mitigate the impacts was an iterative process and continued until an impact was deemed as not significant as reasonably practicable. Residual impacts were those that remained after the completion of this process.

For normal project operations, an impact is assumed to occur, i.e., 100% probability of occurrence.

The significance of impacts on VECs is determined based on scoring VEC sensitivity and the consequence of the impact taking account of:

- magnitude – measure of the degree of change that will be caused by an aspect or activity
- duration – the length of time over which an impact may occur

- extent – the geographical area that may be impacted.

To determine whether an impact is significant, the impact score is a sum as follows:

magnitude + extent + duration + VEC sensitivity = impact score

A threshold score was set to determine if an impact was considered significant.

Abnormal or Unplanned Events

Abnormal operations and unplanned impacts were considered including:

- geotechnical events (e.g., earthquakes, landslides)
- accidental events (e.g., traffic accidents, fire, collision of vehicles with equipment and damage of pipe due to unauthorised digging).

Given the inherent uncertain nature of potential unplanned events, the potential variability of such events in terms of geographic location and coverage, and limitations of directly relevant event statistics, no significance determination was undertaken, but likelihood was estimated for terrestrial events.

Environmental and Social Baseline Conditions

The baseline condition of VECs are summarised below:

Biodiversity

Habitats of Conservation Importance

The majority of habitat types in the AOI are modified (IFC 2012) with some natural habitats still remaining both within and outside of protected areas. Guineo-Congolian semi-evergreen forest and riverine and swamp forest (wetland forests) are of conservation importance in the context of habitat quality within the AOI. These habitats are highly threatened and unique ecosystems (as defined in IFC 2012). Connected forest habitat within and between Budongo, Bugoma and Wambabya Forest Reserves is also of conservation importance, for both the habitat itself and the presence of threatened species (e.g., chimpanzees).

Flora and Fauna Species of Conservation Importance

Ten vascular plants species of conservation importance are present in the AOI and the majority of these species were recorded in swamp and riverine forests and Guineo–Congolian semi-evergreen forest. Species of conservation importance include one IUCN vulnerable vascular plant species, six Ugandan Red List (WCS 2016) species with threat categories ranging from critically endangered to vulnerable, and two Gold Star endemic species, as defined by the Rapid Botanical Survey (the methodology used to characterise the baseline habitats and flora).The presence of *Nymphaea nouchali* (Ugandan Red listed critically endangered) and *Rytigynia beniensis* (endemic) in the Right Of Way (ROW) requires further verification.

Baseline surveys identified the presence or likely habitat usage of thirteen fauna species of conservation importance within the AOI which are nationally and / or globally rare and threatened. These include, but are not limited to, Bohor reedbuck (*Redunca redunca*; IUCN least concern, Uganda endangered), African golden cat (*Caracal aurata*; IUCN vulnerable,

Uganda endangered), hippopotamus (*Hippopotamus amphibious*; IUCN and Uganda vulnerable) and spot-necked otter (*Hydrictis maculicollis;* IUCN near threatened, Uganda endangered). Chimpanzee (*Pan troglodytes* ssp. *Schweinfurthii*) inhabit Wambabya Forest Reserve, Bugoma Forest Reserve and use connecting habitats in the surrounding landscapes. As chimpanzees are IUCN and Ugandan endangered, they have a very high sensitivity to change.

Avifauna species of conservation importance use habitats within Wamababya FR, papyrus swamps and other wetlands in the AOI, and in valleys throughout southern Uganda. These species are nationally and / or globally rare and threatened, namely, grey-crowned crane (*Balearica regulorum;* IUCN and Uganda endangered) and hooded vulture (*Necrosyrtes monachus;* IUCN critically endangered, Uganda endangered). Kafu, Nabakazi, Katonga and Kibale rivers are sensitive receptors for fish and aquatic macro-invertebrates. Rare or threatened fish and macro-invertebrates were not identified during baseline surveys but are likely to be present. Two migratory fish species were recorded, namely *Barbus kerstenii* and *Schilbe intermedius*.

Habitat loss and fragmentation is driving declines in many species of conservation importance and this trend is likely to continue with increased population pressure and use of natural resources.

Legally Protected, Internationally or Nationally Recognised Area

Wambabya and Taala Forest Reserves, Nabakazi River and Katonga River are legally protected areas of high sensitivity that support species of conservation importance.

Physical Environment

Geology

In Uganda, Precambrian crystalline rock constitutes approximately 90% of the land area. The remaining rock types are mostly younger volcanic and sedimentary rocks. The EACOP project traverses Precambrian gneiss and granite complexes up to the Uganda–Tanzania border. Regolith over this crystalline rock varies from rock fragments near the bedrock interface to well-weathered soil and hardened laterite at the surface. This regolith layer varies in thickness, but averages approximately 30 m.

The occurrence of earthquakes in Uganda is associated with the East African Rift system however the proposed EACOP route does not traverse the system. However, the pipeline RoW crosses six major faults.

Landslides and sinkholes have not been identified across the AOI.

Soil

Soil types with a high sand content, i.e., sandy clay loam and sandy loam, were found to be present along the majority of the route. Topsoil depth within the majority of the AOI was found to be 20–30 cm depth, although thin topsoil (less than 5 cm depth) is likely to exist. Soil within the AOI is mainly characterised as low to medium productivity, supporting grazing, commercial plantations and subsistence farming. Most topsoils were of low to medium organic matter content and high base status, indicating that soils could be productive if well managed. Continued use of the land within the study area for agriculture and grazing is likely to cause continuing deterioration in soil quality.

The soil erosion risk varies across the AOI reflected by the change in soils and terrain. There are both very high risk areas, with very steep slopes, and low risk areas, where the land is flatter and soils heavier.

There is no evidence of noteworthy existing contamination within the AOI.

Surface Water

The pipeline route crosses several permanent and ephemeral watercourses and wetlands belonging to the Lake Albert, Victoria Nile and Lake Victoria basins.

The morphology and stability of the watercourses throughout the AOI are mostly considered very stable, with the exception of Jemakunya River. This is because the floodplains contain swamp vegetation that limits flow velocities and inhibits erosion. The Jemakunya River has a relatively narrow zone of riparian vegetation along its channel, which increases the risk of instability.

Water quality is considered relatively good in the rivers and is consistent with rivers in catchments with dispersed rural settlement, frequent use by livestock and people and for domestic purposes, and in which there is an abundance of swamp vegetation and high rates of biological activity. It is therefore sensitive to change. There are currently few sources of contamination, limited to the frequent use by livestock and by people for domestic purposes in these areas, which could cause an increase in organic compounds within surface water bodies.

Local communities use surface water mainly for livestock watering and domestic purposes. As populations grow this may lead to increased abstractions for water supply, irrigation and commercial uses.

Groundwater

Groundwater quality is generally good in the water basins traversed by the pipeline. The aquifers in the AOI ranged from having low to high vulnerability based on permeability and depth to the water table. All aquifers are recharged by rainfall.

In the AOI, groundwater is the most important source of public water supply being of high quality, used as drinking water and for domestic and agricultural purposes.

Population growth is likely to increase the requirement for groundwater for domestic use. Groundwater in both the sedimentary and basement aquifers is therefore considered highly sensitive to change.

Landscape

The pipeline route traverses a mixed landscape of gently undulating grasslands and farmland, hills with open plateaus and bare rocky outcrops, forested areas, wetlands and, near the border with Tanzania, a drier, more sparsely vegetated landscape. Most of the route has already been affected by human activity for farming and grazing, and areas affected are of low landscape sensitivity. The landscape of PS1 consists of undulating to hilly terrain, which has been affected by human activity for farming and grazing and areas affected are of low landscape sensitivity; the Wambabya Forest Reserve is located 3 km to the east but has no views of PS1 and is therefore not considered sensitive to the project. Similarly, PS2 has been affected by human activity for grazing land and areas affected are of low landscape sensitivity.

The landscape is able to tolerate further similar modification without changing its present character, so it is not regarded as sensitive to change.

Stakeholders did not perceive proposed project infrastructure as negative visual intrusions in the landscape.

Air Quality

Concentrations of NO_2, NO_x, VOC, CO and SO_2 are low at all locations surveyed (i.e., the pumping stations). The baseline environment is characterised by moderate to high levels of airborne fine particulate matter due to natural conditions (dry soils which are easily mobilised in windy conditions). Much of the project's AOI is sparsely populated areas and infrequently populated. There is capacity in the atmospheric environment for gaseous emissions to increase without levels which exceed national standards (and project environmental standards) being reached.

Acoustic

The noise environment in the AOI, particularly around AGIs, is dominated by human induced sources such as road traffic, farming and general human interactions, and by natural noises such as bird song and wind.

The noise environment at locations proposed for the RoW, MCPYs and pumping stations ranged between 26 and 55 dB(A) $L_{90,1hr.}$

There is an absence of industrial and commercial noise throughout the AOI.

Socio-economic and Health

The pipeline traverses 9 districts, 41 parishes, 22 subcounties, 4 town councils and an estimated 172 villages and hamlets. The main livelihood activity in the AOI is agriculture and most settlements are concentrated along national and secondary roads. Villages often have a central trading place in which main business and social activities take place

The main ethnic groups found in the districts in the southern part of the AOI are the Baganda and Banyankole. In the northern part of the AOI, the main ethnic group is the Banyoro. The dominant religions in the AOI are Christianity and Islam often mixed with traditional beliefs.

The population is rapidly increasing, causing pressure on natural resources and social services. The population is young and highly mobile and the districts in the AOI experience urbanisation. Hoima municipality and the urban centres Mbirizi and Kinoni in Lwengo district, have become attractive to rural migrants due to employment and business opportunities and relatively better infrastructure.

Uganda experiences both in and out migration. Migration to Uganda has been driven by civil war and political instability in the Democratic Republic of Congo (DRC), Rwanda and South Sudan.

Adult literacy rates for persons above age 18 range between 66 % and 76% in the districts traversed by the AOI. Males are more literate than females. School attendance rates are improving, however educational services are faced with several challenges including lack of trained teachers, equipment and buildings.

Economy

East Africa is the fastest growing economic region in Africa with recorded regional growth estimated at 6–7% for 2016 and 2017.

Uganda, as a member of the East African Community (EAC) since 2010, shares a common market with Kenya, Tanzania, Burundi and Rwanda. Uganda's Gross Domestic Product (GDP) is approximately 60% of Kenya's GDP (the largest economy in the EAC), placing it behind Tanzania and just ahead of Rwanda (AfDB et al. 2016). The EAC is economically more diverse than other regional African communities because it is less dependent extractive industries.

Uganda's economy collapsed during the 1970s and 1980s due to political uncertainty and ongoing civil war (Byrnes 1990). Since then, the government has acted to rehabilitate the economy and economic reforms have ushered in a period of solid economic growth and lower inflation. Nevertheless, overall productivity remains hampered by supply-side constraints including underinvestment and high production costs in the agricultural sector (CIA 2017, Internet site).

The Ugandan economy is characterised by formal and informal economic activity with the informal sector accounting for approximately 45% of all economic activity (UBOS 2016a). The informal economy refers to a diverse set of economic activities, enterprises and jobs that are not taxed nor regulated by the state and offer little social protection to workers (WIEGO 2018, Internet site).

The service industry typically contributes most to the formal economy with community services, wholesale and retail trade being the most important service sub-sectors, followed by transport and communication (Wiegratz 2009). Tourism is one of the fastest growing service sectors in the Ugandan economy and is the largest foreign exchange earner. Agriculture has traditionally been a major economic activity however it has decreased relative to other sectors in recent years primarily as a result of growth in other sectors such as manufacturing.

The industrial sector is relatively small but has recorded high growth rates over the past three decades. However, the industrial sector is dependent on imported equipment and energy (oil) and is impeded by poor infrastructure, high energy costs and low levels of private investment.

Local Economy

Although primary agriculture is the most important livelihood in the districts traversed by the AOI, the following economic activities are also important (DDPs 2015, Atacama Consulting 2017):

- small-scale processing of agricultural products
- small-scale trade in retail merchandise and agricultural produce
- provision of services including tourism and transport.

Local economic activities are predominantly small scale. Business owners are reliant on good road connections between rural communities and urban centres to source supplies and market their goods.

Land-Based Livelihoods

Most farming activities are small-scale and characterised by low-input, low-output subsistence farming with trading of surplus crops. Crop production is predominantly rain fed as irrigation infrastructure is absent in the majority of districts traversed by the AOI. Challenges faced by households engaged in crop farming include limited access to alternative sources of income, lack of education, skills and experience.

Livestock rearing is an important economic activity at household level. The main livestock species are cattle, goats, sheep, poultry, pigs and donkeys. Key challenges include the prevalence of diseases and livestock theft. Localised nomadism, which involves movements of livestock herds (usually cattle) between villages within and occasionally between districts, is common in the sample PACs and essential for the larger herds of cattle.

Artisanal scale mining (ASM) in the districts traversed by the AOI focuses mainly on construction materials such as sand, stone for aggregates, laterite soils for brick making and gold. ASM of gold takes place in Kakumiro, Kyankwanzi and Mubende districts, however it is difficult to determine the exact numbers of people involved, since activities are informal in nature and operations are transient. Women involved in ASM are considered very highly sensitive as they have less access to productive capital than men and may be relying on ASM as a sole livelihood. Children involved in ASM are very highly sensitive since they may be exposed to safety risks and may lack access to education as a result of working in mining activities.

Natural resources play a vital part in the subsistence of rural communities in terms of energy for cooking, food security, construction materials for shelter, medicine and income. Key challenges for natural resource users include the high cost of alternative sources of energy for cooking and lighting and pressure on natural resources due to a growing population encroaching on wetlands and forest areas for dwellings, farming and grazing. Female firewood collectors and wild food users are deemed highly sensitive VECs.

River and Lake-based Livelihoods

Lake fishing and aquaculture are small-scale subsistence activities. There is pressure on the fisheries sector due to increasing crop failures caused by drought or floods forcing crop farmers to look to fishing as an alternative income source. Young people are becoming more attracted to fishing activities as the size of farming plots for the younger generations is diminishing, rendering crop farming less profitable. Fish stocks are decreasing due to overfishing with decreasing fish stocks encouraging the use of illegal fishing gear (e.g fine-meshed nets), which is a major challenge facing lake fisheries. Other major challenges for fisherfolk in the AOI include low returns (owing to use of basic fishing techniques) and increased conversion of wetland areas for agricultural activities, while aquaculture is affected by poor productivity and disease decreasing yields. Fisherfolk, who fish full time, particularly women, landless who fish on rivers and employees of aquaculture enterprises are ranked as very highly sensitive receptors as they have no or limited alternative income generating opportunities.

Land and Property

The Land Act identifies four forms of land tenure: customary, leasehold, freehold and mailo. Most citizens hold their land under customary tenure, which applies to specific land areas that are governed by customary laws. Over 60% of land is held under a customary tenure

system, most of which is found in the northern, western and southern parts of the country and in Hoima, Kakumiro and Kyankwanzi. Key problems associated with this tenure include lack of security for landowners and disadvantages for women.

The Land Act (1998; 2010) provides for two mechanisms in which rights held under customary tenure can be formally recognised:

- acquiring a Certificate of Customary Ownership (CCO). Any person, family or community holding land under customary tenure on former public land may acquire a certificate of customary ownership. A CCO can be acquired through a tiered application process. Applications are reviewed by the Area Land Committee and certificates are eventually issued by the district land board.
- forming a Communal Land Association (CLA) by any group of persons under the Land Act for any purpose connected with the communal ownership and management of land, whether under customary law or otherwise (GOU 2013b).

The third land tenure system (freehold) is similarly governed by the Registration of Titles Act. Under this system, a registration of title in perpetuity and conferment of full powers of ownership is provided to the land holder, who may use the land for any legal purposes. Only national citizens are legally entitled to own land under the freehold system and there is little land held under freehold tenure.

Under the mailo tenure system, land is registered under the Registration of Titles Act, which grants the holder a land title and absolute ownership in perpetuity. Land held under mailo tenure (approximately 23,300 km^2) is confined to Buganda (central Uganda) and Bunyoro (western Uganda). At present there are over 250,000 mailo land title holders in Uganda.

Land and property sensitivity is ranked as very high for female headed households, who are particularly vulnerable due to long-standing discrimination that excludes women from owning, inheriting and controlling land. Households and individuals who have been previously displaced and resettled are also deemed very highly sensitive. Sensitivity is ranked as high for landholders without title deeds as without title deeds, landholders will not be eligible for compensation (only for crops grown). Youths are potentially highly sensitive VECs as a result of having limited access to land outside their customary rights.

Land conflicts form the highest percentage of disputes reported both in formal and informal dispute resolution systems in Uganda. Common concerns reported are landlord-tenant relations on mailo land, disputes over land expropriation by the Government and the implications of oil exploration and mining for local land tenure systems and rights

Workers' Health, Safety and Welfare

Many companies in Uganda have had little previous exposure to basic health and safety standards and occupational health and safety is largely unregulated. Legislation on workers' rights and working conditions exists, however, in practice workers are not always provided with adequate information regarding their terms of employment and their labour rights, particularly workers active in informal economic sectors. Baseline data revealed a low awareness level of health, safety and workers' rights and of a non-discriminatory work culture in the PACs.

The sensitivity of the workers' health, safety and welfare is ranked as very high for the local workforce owing to low levels of occupational health and safety awareness.

Social Infrastructure and Services

PACs rely on radio as the main means of receiving information, although mobile phones and the internet are becoming increasingly important means of information exchange. Rural electrification is still low, limiting general development.

Social infrastructure and services sensitivity is ranked as low for PACs in relation to media; all households have access to one or more media information sources. PACs are ranked as moderately sensitive VECs in relation to electricity; most PACs do not have access to grid electricity and rely on other means for cooking and lighting. Households without mobile phones and internet access are also ranked as moderately sensitive VECs; they may not receive information shared through those platforms.

Community Health

Most of the population residing in the AOI are now using the formal health care system as well as traditional medicine. This was attributed to ongoing efforts on health education and system strengthening including provision of outreach services. Use of traditional medicine has generally decreased as more people embrace modern healthcare.

There is an increasing trend in noncommunicable diseases, particularly hypertension, heart disease and diabetes, occurring nationwide, which has been linked to urbanisation and associated changes in lifestyle. Chronic malnutrition rates have decreased and acute malnutrition rates have generally remained low and stable at district level.

There has been a decrease in the burden of diarrhoeal diseases in most of the districts traversed by the AOI. This was partly attributed to improvements in hygiene behaviour, with access to safe drinking water and basic sanitation facilities improving. The potential for cholera, dysentery and typhoid outbreaks remain high in all the project districts as a result of underlying challenges in environmental health conditions.

A decrease of HIV prevalence over the past three years was reported in more than half of the districts traversed by the AOI and attributed to the upscale of interventions such as health education, free condom distribution, increased availability and uptake of HIV care and treatment and reduction in HIV-related stigma.

Zoonotic diseases remain a risk to PACs, in particular those that are impacted by influx. Environmental sanitation, health care services and prophylaxis, vector control programmes and influx management are key for controlling vector-related diseases, such as malaria.

Community health sensitivity is ranked as potentially high for children, the elderly, pregnant women, people living in overcrowded areas, PACs with decreased access to appropriate healthcare facilities, people with poor access to clean water and adequate sanitation, women headed households, sex workers and PACs near to artisanal mining sites, along transport route, and access roads. Sensitivity is ranked as potentially very high for immuno-compromised individuals.

Community Safety, Security and Welfare

There are effective established mechanisms for conflict resolution and support groups at village level. Although PACs are generally peaceful, conflicts arise as a result of changing demographics and decentralisation, underlining the requirement for effective stakeholder engagement. There are vulnerable groups, including widow-headed households, children

and people with ill health or living with a chronic illness, which will need special consideration.

Sensitivity regarding community safety, security and welfare is ranked as very high for women; cultural attitudes towards women and their role within the household hinders many females in PACs from engaging in income-generating activities and decision-making processes. Widow headed households, the elderly and the disabled are ranked as very highly sensitive because they are challenged to meet basic household needs and afford healthcare. Children are ranked as very highly sensitive VECs, particularly those from poor households, AIDS orphans and boys from cattle keeping and plantation agriculture communities. Youths are also ranked as very highly sensitive VECs due to their limited access to productive assets, lack of education and vocational skills and scarce employment opportunities. People living with illnesses are ranked as very highly sensitive as they rely on others for financial and food security. Land users without land titles are also deemed very highly sensitive because they will not be eligible for compensation without formal acknowledgement of land ownership (only for crops grown).

Traffic

Roads in Uganda vary in condition; they can have sealed and unsealed surfaces. The use of the roads by pedestrians is common due to the lack of a pavement for walking in most rural areas. Cyclists and boda boda also use the roads extensively, particularly in the more urban areas and the risk of accidents involving pedestrians, cyclists and boda boda is considered high.

Traffic levels are low in the AOI, so congestion is rare, except at the border with Tanzania and in Kampala. The only locations within the project area where some congestion can be experienced are Hoima municipality, and Mutukula town (on the border with Tanzania).

Many of the unsealed roads in the project area are being upgraded and new roads are being constructed by UNRA to support oil and gas infrastructure development.

Cultural Heritage

The definition used by the project for tangible cultural heritage is that it is moveable or immovable objects, sites, structures, or groups of structures having archaeological, palaeontological, historical, cultural, artistic, and religious values. Intangible cultural heritage is defined as cultural resources, knowledge, innovations and practices of local communities embodying traditional lifestyles.

The tangible and intangible cultural heritage identified in the AOI is considered a representative sample. More features will be present in the AOI which will be identified by pre-construction surveys, further consultations with local communities and during construction.

There are no known nationally or internationally designated sites or critical cultural heritage (as defined in IFC PS8) sites identified within the AOI.

Archaeological sites identified include pottery, stone tools, rock-art sites, and iron working sites. Religious structures are the most common cultural heritage with a physical location and a strong intangible sensitivity, including four churches within 100 m of the project footprint, and three cemeteries, two of which two are within the project footprint and a third within 100 m.

Intangible cultural heritage is closely linked to individual and group identity and therefore sensitive to cultural change. Examples of this type of heritage include sacred natural sites and trees, traditional dances, ritual involving the ancestors, traditional healing and medicine, meeting places and sacred rivers and beliefs about twins.

Climate

Since 1960, mean annual temperatures have risen by 1.3°C and annual and seasonal rainfall has decreased considerably across Uganda. Rainfall has also become more unpredictable and evenly distributed over the year.

Uganda is vulnerable to increased climate variability and climate change. For example, the severity and frequency of extreme events such as droughts and floods is projected to increase.

Global anthropogenic GHG emissions, together with other anthropogenic drivers, are extremely likely to have been the dominant cause of the observed warming of the global climate since the mid-20th century. Between 1990 and 2014 Uganda's GHG emissions increased by 71%. However, Uganda has one of the lowest levels of GHG emissions in the world, estimated at 1.6 tCO_2e per capita for 2014, totalling absolute emissions of 59.9 $MtCO_2e$ which is approximately 0.12% of the world total.

Ecosystem Services Provided

Biodiversity

The habitats of conservation importance provide provisioning services such as the collection of timber and other wood fibres for fuel, charcoal production and construction, the collection of plants for food and medicinal purposes and the collection of fibres, resins and other materials. They also provide regulating services (water, erosion, local air quality and local climate regulation) and cultural services (sense of place/way of life, spiritual, sacred and religious values, inspiration for culture, art and design and cognitive development. Habitats also provide important refuge, feeding, watering breeding and nursery areas for a host of terrestrial and aquatic wildlife.

The flora and fauna species of conservation importance provide provisioning services such wild food via hunting, fishing and foraging of plants for personal use or for trade. Keystone predatory bird and large mammal species provide pest and control and regulate ecosystems, while certain fauna species, in particular large mammals and their associated habitats can be vital for eco-tourism. Cultural ecosystem services are provided for in the inspiration for culture, art and design and cognitive development.

Protected areas provide provisioning services (wild foods by hunting and foraging), regulating services (water regulation, local climate regulation and erosion regulation) and cultural services (inspiration for culture, art and design and cognitive development). Certain protected areas are vital for eco-tourism.

Physical Environment

Soil provides both regulating ecosystem services (e.g., erosion regulation and soil quality regulation) and provisioning ecosystems services (e.g., aggregate for construction).

Surface watercourses provide water as a vital provisioning service, for both local people in rural communities and their livestock. People collect water for domestic purposes and small-scale subsistence agriculture. The watercourses and associated floodplains also provide two important regulating services. Firstly, they help to regulate floods by slowing water velocities; storing water on their floodplains; and transmitting water relatively slowly downstream and reducing peak flows. Secondly, the water courses help to regulate water quality in particular where aquatic vegetation is present.

Groundwater is an important provisioning ecosystem service, supplying freshwater for community use. Groundwater also plays an important habitat support role for aquatic and riparian habitats and wildlife, both directly (where groundwater feeds habitats) and indirectly (where groundwater maintains surface water flows).

Landscape has the potential to provide cultural ecosystem services, including nonmaterial benefits from the sense of wellbeing and value provided to people by living in natural environment. However, stakeholders did not perceive proposed project infrastructure as negative visual intrusions in the landscape.

Air quality and the acoustic environment do not provide ecosystem services.

Socio-economic and Health

The Ugandan economy is heavily dependent on agriculture, forestry, fishing, mining and tourism.

Crop farming is a vital provisioning ecosystem service and undertaken throughout the AOI PACs, sometimes providing their only source of food. Livestock rearing also provides a provisioning service, primarily as mitigation against shock events. Land provides a provisioning service resource for livestock keeping, grazing, water sources, range land allowing for livestock herd movements and trees for shelter and medicinal herbs. Natural resources such as fuel (firewood, charcoal), wild foods (honeys, insects, mushrooms, bush meat), timber, medicinal plants and grasses are also provisioning ecosystem services in the form of energy for cooking, construction materials, traditional medicine and income. Artisanal and small-scale mining (ASM) is an abiotic provisioning ecosystem service undertaken primarily in the dry season within portions of the AOI.

Fishing exploits a provisioning ecosystem service, as well as a cultural ecosystem service due to its long standing importance in communities, in particular for the lake fishermen.

Local economy does not have any ecosystem services but relies on ecosystem services discussed in land-based livelihoods.

Safe water as a natural resource is significant provisioning service and plays an important role in the general health and livelihood activities.

Land and property, workers' health, safety and welfare, social infrastructure and services and community safety, security and welfare do not have any ecosystem services associated with it.

Cultural Heritage

Cultural heritage provides cultural ecosystem services, including knowledge systems which provide a framework for understanding the natural environment and ecosystems, and influence social systems, social relations and sense of place in a complex and changing

world, and functioning cultural systems which support subsistence activities, control the use of land, the resolution of conflicts and the day-to-day performance of all the social duties that make the local society 'work'.

Climate

There are no ecosystem services associated with climate.

Stakeholder Engagement

Stakeholder engagement has been an integral part of the development of the EACOP. It is also an integral component of the environmental and social impact assessment (ESIA) process and the foundation for developing and maintaining the project's social licence to construct and operate. It has been undertaken in accordance with the requirements of Ugandan legislation, international requirements as set out in the Equator Principles III and the International Finance Corporation Performance Standards (IFC) (2012) and EACOP principles, protocols and policies for stakeholder engagement.

Stakeholder engagement has been inclusive of all stakeholder categories, including government, civil society, directly and indirectly affected people and communities, with a particular attention paid to the needs of women and those vulnerable to potential impacts. It also included engagement activities regarding human rights.

Stakeholder engagement has been tailored to fit the EACOP project, the ESIA process and the local context, including the nature of the stakeholders. A Stakeholder Engagement Plan (SEP) to support effective engagement throughout the ESIA process was developed. It provides direction for the ESIA engagement approach, stakeholder identification, specific engagement plans for the different ESIA phases and the key deliverables from engagement activities. It focuses on:

- a stakeholder identification and analysis process
- methods, materials and protocols for stakeholder engagement including information disclosure, consultation, and reporting to stakeholders
- the ESIA stakeholder engagement activities
- a data management system for all stakeholder data and minutes of meetings for analysis and follow up
- a project grievance procedure, which also serves as the ESIA grievance procedure.

Stakeholder engagement was conducted during the scoping phase, the baseline and impact assessment phase and pre-ESIA submission to fulfil the objectives. The objectives of stakeholder engagement included:

- obtaining an understanding of the number and types of stakeholders in the socioeconomic study area
- informing stakeholders about the ESIA baseline studies in the areas traversed by the project and associated infrastructure
- obtaining stakeholder input into the scope of the ESIA, including the development of valued environmental (and social) components (VECs), impact identification, mitigation measures and potential sources of cumulative impact and impact mitigation

- listening to questions and concerns from stakeholders and ensure these are addressed in the ESIA
- conducting pre-submission meetings to consult a sample of potentially impacted local stakeholders, prior to the submission to NEMC to acquire their feedback on ESIA findings (impacts and mitigation measures), cumulative impact assessment and mitigation measures.

The engagement provided stakeholders with information about the project and the ESIA, including the engagement process and grievance management. It also provides a mechanism for ongoing stakeholder engagement.

Stakeholder Concerns

A summary of the stakeholder concerns raised and how the project intends to address them is provided below.

Socio-economic and Health

Most stakeholder concerns related to socio-economic and health matters.

Stakeholders raised concerns over land acquisition and compensation for loss of land, livelihoods and properties. The difficulty of finding and acquiring replacement land, the timing of compensation and compensation needs for land-owners and tenants were also raised. There were also concerns about forced resettlement, choice of host area and livelihood restoration, and clarifications were sought about the project right-of-way (RoW).

Stakeholders were informed that the project will manage land acquisition by developing a resettlement action plan (RAP) and a livelihood restoration plan (LRP) and that compensation will be provided in accordance with national law and international standards and before construction begins. It was explained that during construction a permanent 30-m RoW would be required, and a permanent 10-m RoW for operations.

Concerns were raised about project induced in-migration (PIIM), influx management and PIMM related impacts. Stakeholders were informed that an in-migration management plan will be developed and implemented with the objective of reducing the number of people that come to the project-affected communities (PACs) for either direct or indirect project opportunities.

Stakeholders were interested in employment opportunities and procurement opportunities for local people, particularly for women and youths. In response, stakeholders were informed that a transparent recruitment strategy would be developed and shared with communities; about the local content plan developed to maximise the purchase of goods and services from within Uganda; and about the procurement and supply chain management plan which reinforces the use of local workers and suppliers.

Community health and safety concerns were raised, with questions asked about the potential health impacts of the project, including the spread of communicable diseases, road safety, and potential impacts on water quality and of dust generation water quality. In response, information was provided about the health impact assessment and the traffic impact assessment included in the ESIA, the community health, safety and security plan containing the appropriate mitigation, and the pollution prevention plan including dust suppression measures. Stakeholders were also advised that water quality will be monitored regularly and alternative community water sources will be provided where access to water

sources would be restricted by construction. It was noted that the project construction workforce would be accommodated in camps with health and recreational facilities to avoid impacts on local health and other public infrastructure, that camps would be closed and that interactions with local communities would be discouraged.

Physical Environment

Stakeholders raised concerns that the heat from the pipeline would affect the soil productivity and the potential effects on community water sources. The stakeholder engagement team explained that the pipe would be insulated and that the heat from the pipe would not affect soils or crop productivity, and informed stakeholders of the pollution prevention plan which includes measures to minimise impacts on water sources.

Concerns were raised about potential project impacts on air quality and climate change. The stakeholder engagement team explained that the project engineering team will ensure compliance with applicable emission standards.

Biodiversity

Stakeholders raised concerns about the impact of the project on Lake Albert fisheries and impacts on biodiversity in the project area, including impacts on sensitive ecosystems, the interconnectivity of habitats for migratory and endemic species and loss of biomass. Stakeholders were informed that the selection of the pipeline route included consideration to avoid environmental and social sensitivities and that the pipeline will be constructed along existing infrastructure corridors where feasible. They were also informed of the biodiversity management plans and the project aims for no net loss for biodiversity.

Project and ESIA-Related Matters (Including Stakeholder Engagement)

Questions were asked about the ESIA, a definition of the AOI and the grievance mechanism. Stakeholders also requested information about pipeline routing and project design. The stakeholder engagement team informed stakeholders about the ESIA process and stakeholders were advised on the various levels of handling grievances within the grievance mechanism. Feedback was also provided on project design such as pipeline routing, including emphasis of the fact that the route would only be finalised once all studies were completed, oil spill contingency and emergency response planning, and security planning.

Grievance Procedure

EACOP has established a non-judicial grievance procedure to respond to stakeholders' concerns and to facilitate resolution of stakeholders' grievances. The grievance procedure is compliant with the United Nations Guiding Principles on Business and Human Rights effectiveness criteria for project level grievance procedures.

The grievance procedure describes the process available to stakeholders for lodging a grievance during pre-construction, construction and project operations, and is accessible to all stakeholders at no cost and without retribution. Judicial and administrative options can also be pursued by stakeholders.

The project's grievance procedure has been presented to stakeholders during each consultation phase and is managed by EACOP staff (CLO and grievance administrator).

Ongoing Stakeholder Engagement

Post submission stakeholder engagement on the disclosure of the ESIA report will be undertaken after the ESIA report has been submitted to the regulators. The engagement will focus on key stakeholders identified in the scoping and baseline phases. The government EIS disclosure will be conducted in concordance with the National Environmental Act (1998).

Following the ESIA disclosure phase, the project stakeholder engagement team will continue to engage with stakeholders at national, regional and local level throughout the project lifecycle to further discuss the results of the ESIA and how stakeholder concerns have been considered in the ESIA. The engagement strategy will also include targeted engagement with identified vulnerable stakeholders or their representatives.

Engagement activities will be adjusted to reflect evolving project activities, stakeholder preferences and concerns over the life of the project. The project will also seek to build partnerships with NGOs, CSOs and communities to support the development and implementation of practical impact management strategies.

During the construction phase of the EACOP project, local community offices will be established at locations along the route to provide stakeholders direct access to community relation coordinators (CRCs), community liaison officers (CLOs) and grievance officers.

The grievance procedure will continue to provide opportunities for stakeholders and PACs to express grievances about project activities.

A stakeholder engagement monitoring and evaluation programme will be developed to ensure efficient and effective stakeholder engagement, in parallel with community awareness programmes.

Impacts – Normal Operations

A primary project objective is to design, construct and operate, and decommission a pipeline and its AGI with minimal risk, injury or harm to personnel, host communities and their ecosystem services.

Potential impacts on biodiversity, the physical environment, socio-economic and health, and archaeology and cultural heritage during the construction and operation phases are considered in the ESIA.

The following section presents the significant residual impacts remaining after proposed mitigation is applied, and the procedure for decommissioning. Beneficial project impacts are also discussed. All potentially significant ecosystem services related impacts are addressed by the VEC impact assessments and associated management plans.

Beneficial Impacts

A number of potential project impacts, predominantly relating to socio-economic VECs, will be beneficial, including:

- contribution to the national economy from investment
- generation of national and local employment opportunities
- provision of training and skill development opportunities
- opportunities for national and local businesses through project procurement

- improvement in the health and safety of employees from disease awareness and reduction programmes
- increased knowledge and recording of tangible and intangible cultural heritage.

Where possible, enhancement measures will be implemented to increase the benefits to local people, and the local and national economy.

Potential Negative Impacts

The impact assessment process included the application of mitigation to the potential pipeline impacts identified for each VEC. Potential impacts include:

- biodiversity:
    - permanent loss of habitat from operational RoW
    - PIIM to areas around the MCPY causing increased pressure on natural resources
    - stress or mortality to flora and fauna
    - loss of chimpanzee habitat and disturbance to chimpanzees
    - reduced primary productivity in watercourses
    - temporary or permanent loss of breeding and foraging habitat
    - modified habitats due to non-native species establishment
    - loss of ecological function and integrity of protected sites
- physical environment:
    - loss of soil structure, drainage, fertility and seed bank
    - soil contamination
    - contamination of surface and groundwater
    - deterioration of water quality
    - decreased water level due to abstraction for project use
    - reduced air quality from combustion of fuel in construction equipment and vehicles
    - disturbance or nuisance from noise from construction on the RoW and traffic movement
- socio-economic and health:
    - dissatisfaction arising from unmet expectations over the scale and duration of project local employment opportunities
    - competition over employment opportunities
    - inflation and effects on supply owing to project procurement
    - increased transportation costs and travel time with economic consequences
    - permanent loss of land used for crop farming and grazing
    - permanent loss of natural resources
    - temporary loss of access to fishing grounds (rivers, Lake Albert, dams and ponds)
    - permanent loss of private land due to project land acquisition
    - land and property speculation by landowners and third parties
    - increased risk of vector-related diseases among the local workforce

- traffic congestion leading to delays
- increased pressure on regional waste management facilities due to project activities
- an increase in the burden of disease along the project's transport corridors caused by drivers spreading communicable diseases
- nutrition of PACs compromised by reduced food security
- community health and safety incidents associated with accidents during construction
- change in local community dynamics due to employment opportunities
- damage, disturbance or disruption of access to cultural heritage.

The potential impact of the project on climate change has also been assessed.

Significant Residual Project Impacts

The impact assessment process included a process of applying proposed mitigation to the potential project impacts identified for each VEC. Table ES2 summarises the number of generic and location-specific impacts assessed and the mitigation measures for each VEC group.

The significance of impacts was then re-assessed. Based on the mitigation measures planned, including for aspects of biodiversity, for which further enhancement and conservation measures will be developed and implemented through the production of a site-specific biodiversity action plan and support for ongoing forest conservation initiatives, no significant residual impacts are predicted.

Table ES1 Impacts Assessed and Mitigation Measures

	Generic Impacts	**Generic Impact Mitigation Measures**	**Location-Specific Impacts**	**Location-Specific Impact Mitigation Measures**
Biodiversity	33	49	33	28
Physical Environment	25	33	101	36
Social	59	51	158	42

Transboundary Impacts

There are no significant residual transboundary impacts identified.

Cumulative Impacts

Hoima municipality is likely to experience a general economic boost due to the beneficial cumulative impacts from employment, training and purchasing associated with the EACOP project and its associated facilities (Tilenga and Kingfisher projects), and other third-party developments.

The upgrade of the EACOP project access road and the third-party road upgrades is also a long-term beneficial cumulative impact, which will enhance access to the national road network and to health care and reduce travel times including response times in emergency situations.

After mitigation measures have been implemented, a potential cumulative impact remains significant:

- The EACOP project, associated facilities and other third-party developments will change the characteristic rural quality of the landscape and visual receptors around PS1, although the contribution from the EACOP project and associated facilities is small.

    The EACOP project and associated facilities will participate in regional cumulative environmental management initiatives being developed in collaboration with operators of current projects, developers of proposed projects, and led by the government. It is envisaged that initiative management priorities would be defined for implementation by industry participants. An example is the joint forest conservation initiative mentioned below.

Enhancement and conservation measures that will be developed and implemented through the production of a site-specific biodiversity action plan and support for ongoing joint forest conservation initiatives will not only reduce the project impact on chimpanzee habitat but will also reduce the potential cumulative impacts from associated facilities and third party projects.

Associated Facilities

Tilenga Project, Kingfisher Oil Project and concrete batch plants, borrow-pits and waste management facilities (where they meet the IFC definition of associated facilities) have been identified as associated facilities (AFs). The locations of concrete batch plants, borrow-pits and any waste disposal sites required have yet to be defined and so will be subject to the management of change process.

The beneficial impacts of the Tilenga Project and Kingfisher Oil Project are similar to the EACOP project, e.g., increased economic growth, increased employment opportunities and improved health planning.

The Tilenga Project and Kingfisher Oil Project have significant residual impacts on biodiversity and social VECS, particularly impacts relating to PIIM, as well as impacts on surface water, the acoustic environment and landscape character. While the Tilenga feeder pipeline is part of the Tilenga project, the residual impacts are presented separately as a separate ESIA has been produced for the feeder pipeline, however there are no significant residual impacts from the Tilenga feeder pipeline.

Potential Impacts – Unplanned Events

Unplanned events considered include:

- traffic accidents
- fires
- damage to third-party assets
- release of diesel from fuel storage tanks at the MCPY and construction sites

- release of hydrotest water during commissioning
- oil spills
- sabotage
- geophysical hazards.

The project has adopted engineering design criteria that aim to reduce the probability and consequences of unplanned events that could lead to impacts to social or environmental receptors. At each stage of the design process, a series of health, safety and environmental (HSE) studies has been, and will continue to be, undertaken.

The project has completed a technological risk assessment (TRA) during front end engineering design (FEED) in accordance with the EACOP Project HSE risk assessment methodology.

Risk assessment has been undertaken to inform:

- the design process
- the ESIA process, and the development of mitigation measures.

Additional risk assessment will be undertaken during detailed engineering and construction planning.

An emergency response plan will be prepared which clearly identifies possible emergency scenarios, sets out actions to be taken in the event of an emergency, and defines resources that will be made available to respond to an emergency event. It will comprise of several management plans and procedures, such as an oil spill contingency plan, spill management and response plan, and a community health, safety and security plan.

Work has been undertaken that supports the establishment of a preliminary rating of the risks and related significance, based on existing engineering knowledge and project design, and professional judgement.

The project will reduce risk through:

- design and construction mitigation
- health, safety, security, society and environment (H3SE) systems and procedures
- emergency response planning.

The project has considered design and construction opportunities to reduce risk during construction and operation throughout the design process and will have in place an HSE Management system with which contractors will be required to comply during construction.

Decommissioning

The project components (i.e., pipeline, PS) will be decommissioned based on Ugandan regulations and standards and international standards and protocols.

A decommissioning plan, which includes a social management component that addresses the impact of decommissioning (loss of jobs, economic activity), will be prepared and the scope will be developed in consultation with stakeholders at that time. The decommissioning plan for the construction facilities will ensure that all the project components that were required for constructing the pipeline, but that will no longer be required during the operational phase, are removed and land is returned to the Government. The

decommissioning plan will include specific consideration of unplanned events which may occur during decommissioning consistent with EACOP project requirements.

Environmental and Social Impact Management Plans

In accordance with the Environmental Impact Assessment Guidelines for the Energy Sector in Uganda, 2004 and the Environmental and Social Impact Assessment Guidelines for the Energy Sector in Uganda, 2014, an environmental and social management plan (ESMP) has been developed.

The project ESMP is consistent with the EACOP code of conduct and H3SE policy, and charters.

The ESMP presents monitoring parameters and proposed performance indicators and targets that will steer environment and social performance toward continuous improvement. A comprehensive reporting system will also be developed.

A suite of management plans will be prepared to support implementation of the ESMP. Minimum content of these management plans are the mitigation commitments developed throughout the ESIA.

A separate suite of management plans will be drafted for:

- terrestrial construction
- terrestrial operations
- marine construction
- marine operations.

The following is a list of the management plans that will be developed prior to the commencement of construction and operation activities:

- biodiversity management plan
- pollution prevention plan
- waste management plan
- natural resource management plan
- soil management plan
- cultural heritage management plan
- reinstatement plan
- stakeholder engagement plan
- resettlement action plan
- labour management plan
- project induced in-migration management plan
- procurement and supply chain management plan
- infrastructure and utilities management plan
- community health, safety and security plan
- occupational health, safety and security plan
- transport and road safety management plan
- emergency preparedness and response plan

- monitoring and reporting plan
- decommissioning plan.

Changes to the project may occur subsequent to preparation and submission of this ESIA. A management of change procedure will be implemented, that includes:

- environmental and social appraisal of the change, including the identification of new or revised mitigation measures
- health and safety evaluation
- consultation with engineering and H3SE disciplines
- consultation with NEMA on the need for amendments to the ESIA permit
- management of change approval process.

After management of change approval, changes to the ESMP and supporting management plans will be implemented.

Recommendations

The ESIA has been prepared by an experienced team with extensive pipeline engineering, environmental and social impact assessment knowledge, including Ugandan partners with expertise in ESIA development in the Ugandan oil and gas sector. The team has quantitatively and qualitatively identified and assessed potential interactions between the project and VECs in the project AOI. The recommended measures, consolidated in the ESMP, which are either incorporated into project design, or actioned during project implementation, are intended to mitigate the impacts and their significance.

The EACOP project, with due consideration to the management of associated environmental and social impacts, will:

- contribute to the economy
- provide business opportunities for different sectors of the economy and enhance capacities of local companies
- provide employment, knowledge transfer and skills development opportunities during construction and operation.

As these are benefits in the public interest, it is requested that NEMA approves this environmental impact statement.