

EAST AFRICAN CRUDE OIL PIPELINE



TANZANIA

ENVIRONMENTAL IMPACT STATEMENT

NON-TECHNICAL SUMMARY

Submitted to:

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Introduction

The East African Crude Oil Pipeline (EACOP) will transport oil from the delivery point in Hoima District, Uganda, to a storage tank facility in Tanga District and a nearby offshore tanker loading platform, on the East African coast of Tanzania.

Potential impacts, positive and negative on the economy, people, and environment in Tanzania have been described and assessed for many features considered to be valued and important to society (for example, protection of people's livelihoods). Measures to avoid or reduce negative impacts are described, and after the measures are applied, the predicted remaining impacts are described.

An environmental impact statement has been prepared based on the:

- Government of Tanzania Environmental Impact Assessment and Audit Regulations G.N. 349 (2005)
- EACOP Scoping Report and terms of reference approved by the National Environment Management Council dated 15 September 2017.

Who is involved?

Shareholders

- Uganda National Oil Company
- Tanzania Petroleum Development Corporation

Developers and operators

- Total E&P Uganda B.V
- Tullow Uganda Operations Pty Ltd
- CNOOC Uganda Limited

Project developer

- Total East Africa Midstream BV



Project Description

Figure 1 shows the EACOP project in Tanzania that is comprised of:

- a 1147-kilometre-long, 24-inch-diameter buried pipeline from the Uganda-Tanzania border to a peninsula north of Tanga. The pipeline will be insulated and will have an electrically heated cable on the pipeline to keep the temperature of the oil at 50° C or warmer so the oil will flow in the pipeline.
- aboveground installations consist of:
 - four stations with pumps (pumping stations) to keep the oil moving through the pipeline from west to east
 - two pressure-reduction stations on the part of the pipeline that traverses from higher ground to the coast, to reduce the oil pressure before it enters the storage terminal
 - storage tank facility adjacent to Tanga Bay, which includes a pressure reduction system (marine storage terminal)
 - an 1.9-kilometre-long frame (trestle) to support pipeline above water to transfer oil from the storage tanks to a loading platform where the oil will be loaded on to tankers (the trestle and loading platform combined is called the load-out facility)
 - 60 valves at key locations where the oil flow can be reduced or stopped
 - 21 electrical substations to power the electrically heated cable
- roads
 - 47 kilometres of new and upgraded permanent access roads
 - 60 kilometres of new and upgraded (temporary) roads for getting to construction facilities
- construction facilities
 - 12 main camps and pipe yards where pipe and equipment will be stored and construction workers housed
 - a facility for coating the pipe with insulation.

MEASURES TO AVOID OR REDUCE NEGATIVE IMPACTS ARE DESCRIBED, AND AFTER THE MEASURES ARE APPLIED, THE PREDICTED REMAINING IMPACTS ARE DESCRIBED.

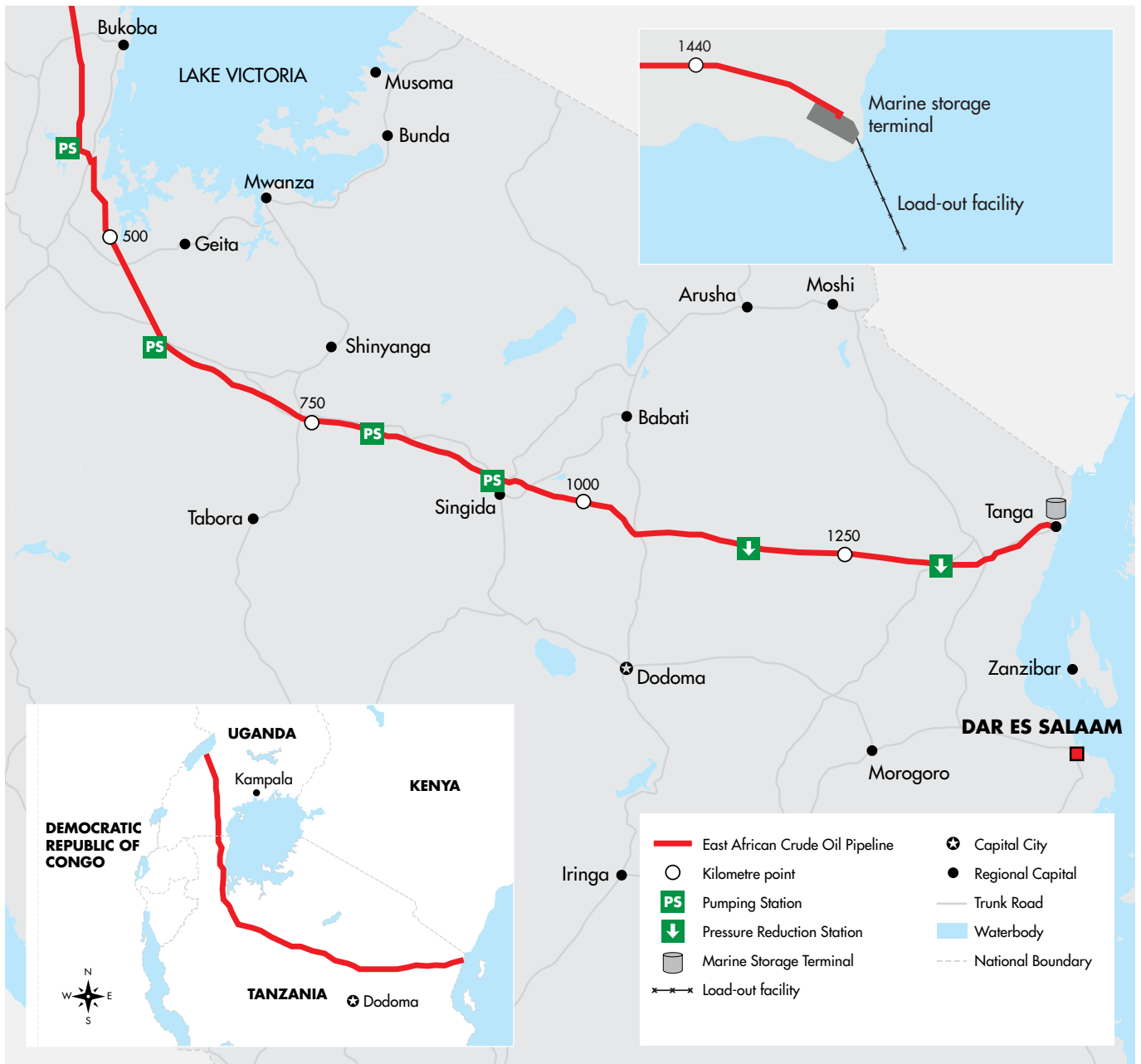


FIGURE 1: The EACOP Project

Project Alternatives

Project alternatives have been considered for:

- pipeline routing
- siting construction and operation facilities
- technology
- construction techniques.

Routing

Alternative pipeline routes were identified early in the project development. The routing process began with the identification of a starting point and a flexible end point which was then followed by several studies evaluating constraints such as:

- whether there were landslide and erosion risks
- the number and type of river crossings
- potential impacts on people and the environment

This work finished with the selection of eleven 50-kilometre-wide corridors for more detailed evaluation. Existing information (for example, satellite imagery, maps and reports) was used to assess these corridors. Three options were selected:

- Kenya North
- Kenya South
- Tanzania.

Higher-resolution satellite imagery was then used to refine these routes by analysing the constraints listed above. In April 2016, following this work, the Government of Uganda announced the selection of the Uganda–Tanzania route shown in Figure 1.

Facility Locations

Alternative numbers, locations, layout and footprint of the aboveground installations and construction facilities (including the main camp and pipe yards, and coating facility), and alternative locations for the storage tank facility and the tanker loading platform have been considered.

The main reason for choosing each site has been to ensure that the facility can do the work it is designed to do.

Aboveground installations

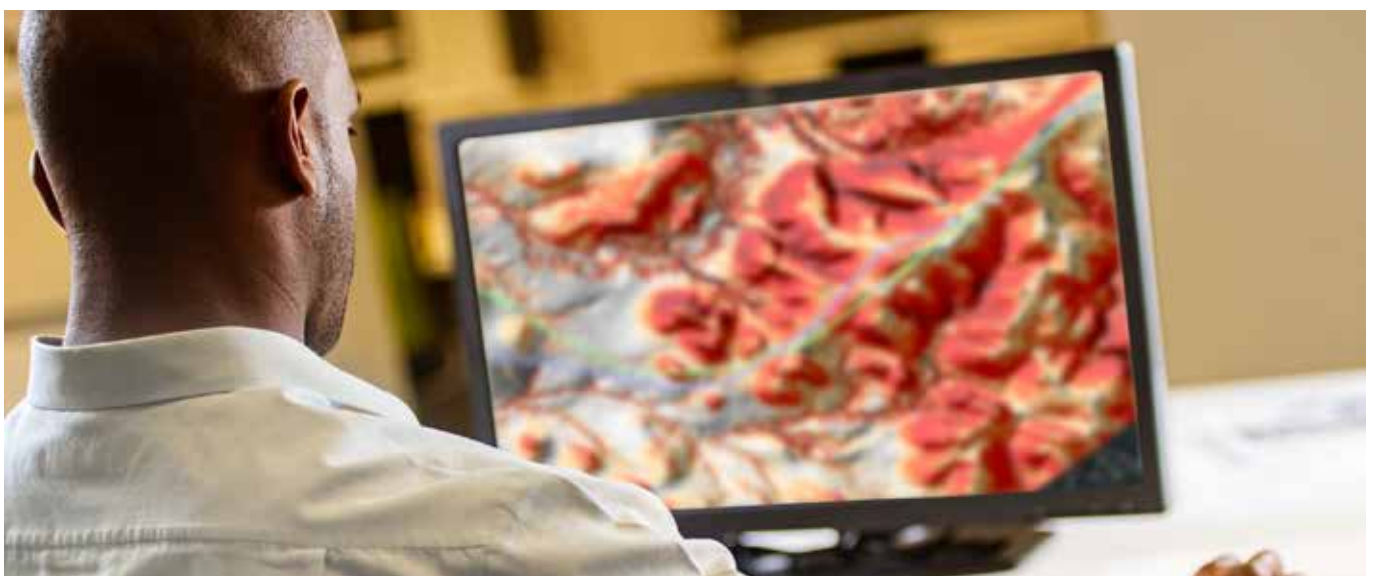
The oil flow requirements in the pipeline provided the basis for the spacing of the pumping and pressure-reduction stations before the early engineering and design work was done. The following factors were also considered:

- the need to keep the oil at a temperature of 50° C so it can flow
- the need to keep people and the environment safe
- the need to avoid areas important to people and wildlife
- the physical conditions of each site (the features of the land surface and their distance from roads).

Satellite imagery and visits to the sites were used to choose the locations during the early engineering and design work.

The final position of the substations needed for the electrical cable heating system will be chosen following further studies. The sites for the valve stations have been selected based on detailed risk analysis which looked at the potential for a leak from the pipeline and the consequences of such a leak.

SATELLITE IMAGERY AND VISITS TO THE SITES WERE USED TO CHOOSE THE LOCATIONS DURING THE EARLY ENGINEERING AND DESIGN WORK.





Construction Facilities

Construction facility sites have been selected to:

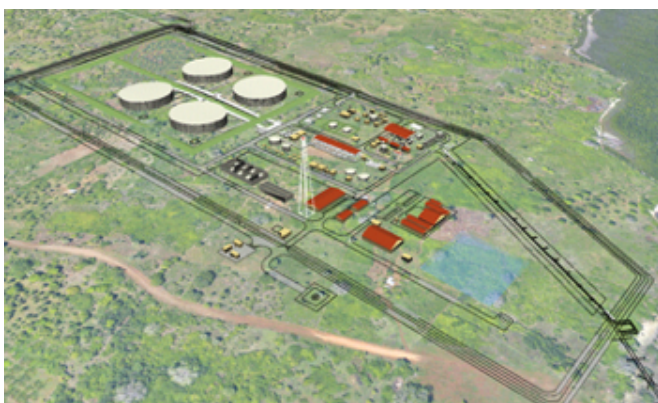
- minimise the amount of land needed and disruption that using this land may cause
- minimise the distance from roads
- avoid populated and nationally protected areas of value for wildlife
- provide a relatively flat surface.

Storage Tank Facility Near Tanga

Many regional-level studies were made during the early stages of the project to consider the best location for the storage tanks. The selection considered the need to have a loading platform suitable for very large ships. The effect on people and the environment were also considered, along with how easy it would be to build the terminal.

Fifty possible sites were identified. This list was reduced to 34 and then to the 4 most suitable sites.

The selection of the Tanzania pipeline route meant that the storage tank facility had to be in the Tanga region. This led to looking at sites on the Chongoleani peninsula, approximately 6 kilometres northeast of the seaport of Tanga.



The preferred option was selected because it:

- is further from the settlement of Chongoleani and cultural sites (a Sharif Tomb and a sacred baobab tree)
- has lower risk of project impacts on groundwater compared with other options.

Trestle

During the early engineering and design work, many locations were looked at for the frame ('trestle') to hold the oil transfer line from the storage tanks to the loading platform. Three options were considered best for the position and length of the structure. The main reasons for choosing these locations were:

- to avoid damage to a coral reef from building the foundations and removing rock
- to avoid impact on mangrove
- joining the trestle with the storage tank facility
- to reduce its length, the amount of land needed and the effects on the seabed from its construction.

The final location was selected because the loading platform could be built away from the coral reef and with a shorter trestle, which will help to reduce the effect of construction on the marine environment. The location is also good for the loading platform that will need to be in water deep enough for access by large oil-export ships.

Loading Platform

The most common wind and wave conditions were used to make the first selection for the loading platform location. All four locations considered were outside the nationally protected Tanga Coelacanth Marine Park. These were looked at for the effect on people and the environment, including their distance from the park. Three of the sites needed much longer trestles with greater effects on the marine environment and people using the sea, such as fisherfolk, during construction. The fourth was selected as it has the least effect on the nearby environment (in particular mangroves) although it is the closest to the park.

Technology

Alternatives were considered for:

- the pipeline (different diameters of pipe and wall thickness)
- pumps
- power generation
- insulation
- heating
- oil storage.

Pipeline

A partially aboveground pipeline was considered, but the option was not taken further because of security and safety concerns, the risk of interference by people, and its effects on views and the movement of large animals. A buried pipeline was selected.

Treating the oil to prevent it from gelling during transportation was considered, but insulation and heating, when necessary, to keep it warm, was considered to be a better option.

Pumps

The oil characteristics ruled out some types of pumps. Those selected are the most suitable for the task, proven, robust and cost effective.

Power Generation

Several ways of generating electrical power were considered, including using engines powered by crude oil, gas oil or gas; turbines powered by steam and electricity from the power supply network or solar electricity.

Engines burning crude oil from the pipeline have been selected as they are the most efficient, self-reliant and technically best option. However, the viability of using solar power to supply further power continues to be investigated.

Insulation

Early studies show that to keep the oil warm enough to flow in an un-insulated pipe, 35 oil powered heating stations would be needed. Building and operating these stations would have led to a greater impact on people and the environment, and higher fuel and costs. The number of heating stations is reduced to six by insulating the pipeline. Insulation will mean a higher initial cost, but less impact on people and the environment, and lower cost over the project's lifetime.

Three types of insulation were considered:

- foam made from a man-made resin (polyurethane)
- glass
- pipe within another pipe.

Polyurethane foam was chosen as the best option, as it gives the best insulation with lowest cost.

A BURIED PIPELINE WAS SELECTED AS IT OFFERS BETTER SECURITY AND SAFETY



Heating

In addition to insulation, three ways of keeping the oil hot enough to flow were considered:

- an electrically heated cable on the pipe
- heating the oil at different places along the route
- heated cable and heating the oil (mixed heating).

The mixed heating option was selected based on its efficiency.

Oil Storage

Three types of storage tanks were considered:

- fixed roof
- external roof floating on the oil
- internal roof floating, but under an external fixed roof.

Based on the volume and size, the external floating roof option was selected.

Construction Techniques

Several pipeline construction techniques were considered for crossing rivers and roads, including:

- digging of a trench
- drilling a horizontal hole for the pipe
- digging a small tunnel
- boring a hole for the pipe for a short distance.

The digging of a trench is proposed for most river crossings and the drilling of a horizontal hole is considered the most suitable technique for crossing under two of the larger rivers. Subsurface crossing techniques will generally be used to avoid disruption to road and rail transportation.

Legislative, Policy and Administrative Framework

The environmental and social impact assessment (ESIA) was developed to comply with Tanzanian laws, Government policies and plans, and the International Finance Corporation Performance Standards (IFC, 2012). Project standards (maximum

limits) have been developed to control project emissions to air, water, and noise.

The ESIA is being submitted to the National Environment Management Council.

The pipeline will cross Uganda and Tanzania, and the governments of these countries have signed an agreement to streamline the legal regime for the project.

ESIA Methodology

ESIA Process

The ESIA included several steps:

- early identification (screening) of potential project impacts, mostly through routing studies
- the identification of potentially significant impacts for further detailed assessment (scoping). As part of this work, an area of influence was identified for each environmental or social feature – the largest area that could be affected, for example, for noise from a pumping station, the maximum distance from the station that noise is likely to be heard.
- desk-based analysis and surveys (baseline studies) to get enough information to understand the environmental and social conditions
- the identification of potential project impacts and development of measures to reduce and manage these impacts (mitigation). This process has been repeated to ensure that the project adopts the best mitigation measures. The process will continue in future stages of detailed project design and during construction.
- bringing together the mitigation and management measures into an environmental and social management plan, and bringing the monitoring measures into an environment and social monitoring plan.

The ESIA and project teams talked to people that may be affected by the project during the ESIA process and their views have been used to develop the project design and understand their perspectives on impacts and measures to reduce the impacts.



THE ESIA PROJECT TEAM TALKED WITH PEOPLE THAT MAY BE AFFECTED BY THE PROJECT DURING THE ESIA PROCESS.



THE ESIA FOCUSED ON THE IMPACTS ON 'VALUED ENVIRONMENTAL AND SOCIAL COMPONENTS' (THOSE FEATURES CONSIDERED TO BE IMPORTANT BY SOCIETY)

Valued Environmental and Social Components

The ESIA focused on the impacts on 'valued environmental and social components' (those features considered to be important by society) and their associated benefits to humans (known as 'ecosystem services'). The joint effects from this project and other projects which may be built or operated nearby were considered too.

The sensitivity of each valued environment and social component to the potential project effects has been determined and graded. For some components there are laws that set limits, for example, the level of impurities allowed in air. How close the project will come to these limits has been used to help predict the size or significance of an impact.

Impact Assessment

The ESIA identifies, describes and assesses the potential impacts from the EACOP project on each component.

Normal Operations

The potential project impacts when the project has normal operations were assessed, including:

- project impacts that could happen anywhere on the pipeline route, and those that could happen at a specific location
- project impacts remaining after mitigation added to impacts from other projects
- impacts that could extend across national boundaries.

The significance of the impacts was determined without, and then with, mitigation measures applied. Measures to reduce the impacts were developed continually until, as much as possible, an impact was no longer ranked as significant. Any effects left after mitigation are called residual impacts.

The significance of impacts on the valued environmental and social components was determined by combining the sensitivity of the component and the consequence of the impact, taking into account the:

- level of change that could be caused by the project (magnitude)
- length of time over which an impact could occur (duration)
- area affected by the impact (extent).

The sensitivity, magnitude, duration and extent were given a score and added to give an impact score.

Impacts with scores over a set number were considered significant.

magnitude + duration + extent + feature sensitivity = **impact score**

Abnormal or Unplanned Events

The potential project impacts from unplanned event were assessed including:

- earthquakes and landslides
- accidents from road and ship collisions, fire, pipe damage from unauthorised digging and inland oil spills and in the ocean.

The chance of happening has been estimated for land events, and the chance of happening and the consequence, estimated for marine events.

Environmental and Social Baseline Conditions

The following sections describe the current condition for different environmental and social features in the area of influence (for example, air quality), their trends and sensitivity to change that may be caused by direct or indirect project activities.

Biodiversity

Habitats of Conservation Importance

The project's area of influence is mostly in habitats which have been changed by humans, but is in some natural habitats inside and outside areas protected by law. Habitats of conservation importance within the project's area of influence include:

- Itigi-like thicket – vegetation with similarities to Itigi thicket, which is unique to Tanzania and Zambia
- dry miombo woodland
- coastal forest and woodland
- riverside forest
- other coastal vegetation types.

These habitats are threatened and unique within the broader region of East Africa and thus are highly sensitive to change.

The land needed for the coating facility is within the central and eastern miombo woodland region, which extends across ten countries in central and southern Africa. However, the facility is in an area mainly used for agriculture with scattered scrub.

The storage tank facility at Chongoleani is in an area of coastal woodland heavily modified for agricultural activities. This area is included in the East African Coastal Forest Endemic Bird Area (an important area for birds with restricted ranges) and biodiversity hotspot. Habitat clearance for grazing, crops, wildfires and timber are the main threats to coastal forest and this trend is likely to continue. Large areas of the land proposed for the storage tank facility have already been changed by agriculture activities and are therefore semi-natural.

THE PROJECT'S AREA OF INFLUENCE IS MOSTLY IN HABITATS WHICH HAVE BEEN CHANGED BY HUMANS.





Bubbling puddle frog

ANIMALS THAT HAVE BEEN FOUND IN THE AREA OF INFLUENCE INCLUDE AFRICAN WILD DOG, ELEPHANT, HIPPOPOTAMUS AND LION.

Plants and Animals of Conservation Importance

Thirty-four plants of conservation importance have been identified, including 11 listed as vulnerable and one listed as endangered by the International Union for Conservation of Nature. Most of these plants were recorded in the dry miombo woodlands, Itigi-like thicket and coastal vegetation areas. All these plants have a high sensitivity to change and those listed as endangered have a very high sensitivity to change.

Information shows that animals classified by the International Union for Conservation of Nature as vulnerable or endangered are of conservation importance have been found in the area of influence. These include African wild dog, elephant, hippopotamus and lion. Some animals native to the region or with restricted ranges are also of conservation importance, including Zanzibar galago, Masiliwa snout burrower and bubbling puddle frog. Other animals of conservation importance that are listed vulnerable are leopard, Temminck's ground pangolin, giraffe, straw-coloured fruit bat and Hildegarde's tomb bat.

Seventeen birds of conservation importance use habitats within areas that may be affected by the project. These include hooded vulture, grey crowned crane, white-backed vulture and steppe eagle, which are classed as critically endangered or endangered by the International Union for Conservation of Nature. Several endemic and or range-restricted birds also habitats that may be affected by the project, including papyrus yellow warbler, Karamoja apalis and orange-bellied parrot.



Elephant



Fish and water-living macro-invertebrates (small animals, large enough to be seen with the naked eye, without a spine) of conservation importance inhabit the Kagera Pangani and Sigi Rivers, Lake Victoria and Wembere wetlands and seasonal watercourses within the area of influence. These sites support natural habitats of moderate to high sensitivity. Threatened fish in these aquatic habitats include critically endangered or native fish of very high sensitivity.

Habitat loss and fragmentation is causing a decline in many plants and animals 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 Areas

The Minziro Nature Forest Reserve, the Burigi-Biharamulo and Swaga Swaga Game Reserves are legally protected within the area that may be affected by the project.

The Wembere Steppe Key Biodiversity Area and Important Bird Area, Singida Lakes Important Bird Area, Talamai Open Area and East African Coastal Forest Endemic Bird Area are internationally or nationally recognised areas within the zone that may be affected by the project.



Physical Environment

Geology

Tanzania has old and young rock, and a complex geological history. The oldest rocks are in the centre of the country and are surrounded by younger rocks. The rock in the Tanga is sandstone, siltstone and shale, and occasionally limestone.

Central Tanzania is prone to minor earthquakes associated with the East African Rift system. Landslides and sinkholes have not been identified in the project area of influence.

Soil

The soil along most of the area of influence has a high sand content. The topsoil (the layer where most biological activity happens) is typically 20–40 centimetres deep, although in some areas it is likely to be less than 5 centimetres deep. The soil is mainly low to medium productivity, supporting cultivation and grazing, although there is some high productivity land used for cultivating maize, sisal, mangoes and oranges.

Soil erosion risk varies across the area of influence, with greater risk on steeper slopes. The land is subject to drought and flooding, which may intensify weathering, making the soil more prone to erosion and causing the loss of nutrients and organic matter.

There is no evidence of soil contamination within the area of influence.

HABITAT LOSS AND FRAGMENTATION IS CAUSING A DECLINE IN MANY PLANTS AND ANIMALS OF CONSERVATION IMPORTANCE AND THIS TREND IS LIKELY TO CONTINUE WITH INCREASED POPULATION PRESSURE AND USE OF NATURAL RESOURCES.

Surface Water

The pipeline area of influence includes watercourses and wetlands belonging to the Victoria and Tanganika lake basins, the Wami–Ruvu and Pangani basins, and the internal drainage basin. Only a few of the watercourses flow all year, with most dry for part of the year.

Some of the channels are less stable than others, particularly those formed in loose sandy soils with limited protection from scrub riverside vegetation where there is evidence of existing erosion.

Water quality is relatively good for most watercourses and is consistent with rivers in catchments with dispersed rural settlement. This means that it is sensitive to change. There are a few sources of contamination, mainly frequent use by livestock and by people for domestic purposes, which could cause an increase in organic compounds.

People use surface water mainly for their livestock and domestic purposes. Water use, including for irrigation, may increase as populations grow, reducing flows downstream in areas where accessibility is already limited and water is scarce.

Groundwater

Groundwater is the most important source for public supply in the water basins traversed by the pipeline. Groundwater is used for drinking and domestic purposes, and is generally good quality, although near Tanga it can be salty. Groundwater supports some habitats, such as the Minziro Forest.

Groundwater bodies of in the area of influence range from moderate to very high vulnerability depending on how easily water flows through the rock and depth to the water table.

Population growth is likely to increase the need for groundwater for domestic use. Groundwater is therefore considered highly sensitive to change.

PEOPLE USE SURFACE WATER MAINLY FOR THEIR LIVESTOCK AND DOMESTIC PURPOSES. WATER USE, INCLUDING FOR IRRIGATION, MAY INCREASE AS POPULATIONS GROW, REDUCING FLOWS DOWNSTREAM IN AREAS WHERE ACCESSIBILITY IS ALREADY LIMITED AND WATER IS SCARCE.





STAKEHOLDERS DID NOT SEE THE PROPOSED PROJECT AS AN INTRUSION IN THE LANDSCAPE. HOWEVER, THE TOURIST AREAS OF TANGA AND ALONG THE COAST ARE RANKED AS HAVING HIGH VISUAL SENSITIVITY.

Landscape

A landscape of valleys, plains, ridges, wetlands and mixed farming areas exists within the pipeline area of influence. Most of the route traverses areas of farming and grazing so the landscape has low sensitivity to the potential; effects of the project. Exceptions include the more natural, scenic landscapes at one pumping station and one pressure-reduction station. A pressure-reduction station is within the Talamai Open Area which has been partially affected by human activity.

Two more sections of the route traverse more naturally scenic areas. The first lies within the Ruiga River Forest Reserve and Burigi–Biharamulo Game Reserve which has natural vegetation, including patches of itigi thicket and old-growth woodland. The second section is remote from settlements and has a mixture of grassland with scrub and trees that lie between large areas of rock.

At the storage tank facility and loading platform, Tanga Bay opens to the Indian Ocean. There are islands and sand banks in the coastal waters, including the forested Kwale and Ulenge Marine Reserve Parks, creating a seascape of some natural scenic value.

With a few exceptions, the landscape should tolerate further similar modification without changing its character, so it is not regarded as sensitive to change.

Stakeholders did not see the proposed project as an intrusion in the landscape. However, the tourist areas of Tanga and along the coast are ranked as having high visual sensitivity.

Air Quality

All the surveyed locations had relatively good air quality because much of the project traverses sparsely populated areas where there are few sources of air emissions, although there were moderate to high levels of dust detected.

Noise

The noise in the area of influence, particularly around the aboveground installations, is dominated by the sound of farming activities, wind through vegetation, bird song and occasional vehicles. Around some of the main camp and pipe yards and the coating facility more traffic and traffic-related noise was recorded.

There is no industrial and commercial noise throughout the area of influence.

Marine Environment

Marine Physical Processes

The nearshore area of influence is dominated by soft seabeds with small fossil reef islands and some coral reefs. Currents are slow and vary in direction. The seawater quality is high and sensitive to change. The seabed sediment is relatively unpolluted and sensitive to change.

Marine Acoustic Environment

The marine environment has low-level noise from vessel movements and intermittent noise from blast fishing. This is in addition to low-level surrounding background noise from marine physical processes (for example, waves) and marine animals.

The sensitivity of fish and marine mammals to the noise that reaches them defines the sensitivity to change of the underwater noise and vibration (acoustic) environment.

Intertidal and Subtidal Plants and Habitats of Conservation Importance

The marine and intertidal environment around Tanga has three main habitats of high conservation value: mangroves, seagrass beds and coral reefs.

The seagrass beds are rich in plants and animals, supporting seven out of the ten seagrasses found in Tanzania. Mangroves are also rich in plants and animals. Both habitats can tolerate short-term or localised stress. Mangroves are being cut by third parties resulting in low regeneration rates.

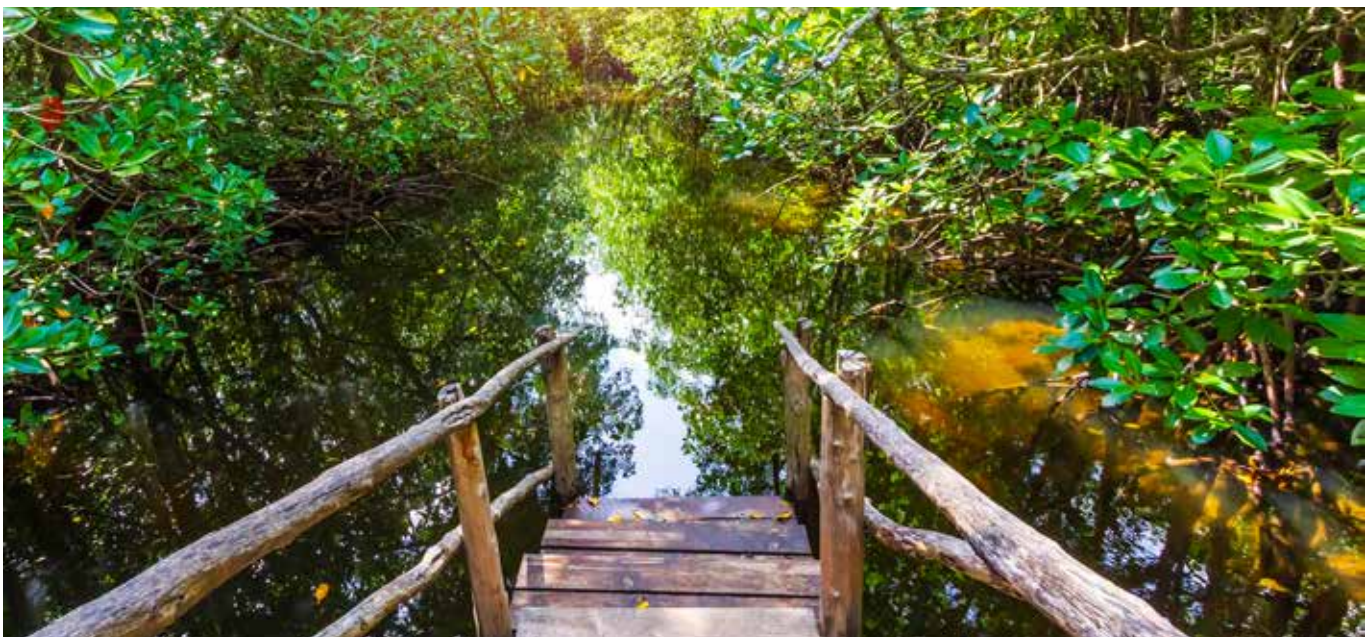
These habitats, and the coral reef described below, are highly threatened and unique living systems. As such, they have very high sensitivity to change.

Animals of Conservation Interest

Coral reef development is fragmented in the Tanga region, with the Ulenge and Kwawa reefs closest to the area of influence. Coral reefs support a wide variety of life, including fish, shellfish, marine mammals, turtles and birds of conservation importance. There are also corals that do not form reefs, and there is a strong likelihood that at least one of three corals listed as endangered by the International Union for Conservation of Nature occurs in the area of influence.

Many of the animals supported by the seagrass, mangroves and coral reefs are of high conservation value and many have economic value, in particular, sharks, reef fish and shellfish. Animals of conservation importance include coelacanth, hawksbill turtle, green turtle, Indian Ocean humpback dolphin and three types of sea cucumber – some of which are classed as critically endangered or endangered. The migratory humpback whale visits these waters.

MANGROVES ARE RICH IN PLANTS AND ANIMALS, BUT CAN TOLERATE SHORT-TERM STRESS.



Legally Protected, Internationally or Nationally Recognised Areas

The area of influence includes nationally protected marine areas, including Tanga Coelacanth Marine Park, and Ulenge and Kwale island marine reserves. Mangroves are also legally protected forest reserves because they are highly threatened and important in Tanzania.

There are two ecologically or biologically significant marine areas identified by the Convention on Biological Diversity in the area of influence. One is the whole of the Tanga Coelacanth Marine Park, which is designated for its coelacanths, dugongs and turtles. The other is the Pemba–Shimoni–Kisite area, which is further offshore. Its deep waters support fish, turtles, dolphins, whales and dugong.

There are two Important Bird and Biodiversity Areas near Tanga: the Tanga North–Kibo Saltpans, designated for its greater sand plover and curlew sandpiper; and Tanga South, designated for its greater sand plover and crab plover.

A marine conservation area is proposed between Tanzania and Kenya by the Tanzania Marine Parks and Reserves Unit and the Kenya Wildlife Service.

Shipping, Navigation and Fisheries

Tanga Port is the second largest port in Tanzania, but small in terms of its area and the volumes of cargo handled. Gas and oil tankers, and passenger and cargo vessels use the port, with an average of one cargo or container vessel, and one vessel of another type coming in and out each week.

Many coastal communities participate in fishing. The traditional fleet is largely 3–5-metre-long dugout canoes, powered by paddle and sail, and 6–15-metre-long wooden planked boats with inboard and outboard motors. Fishing commonly uses gillnets and lines, including longlines.

Socio-economic and Health

The pipeline traverses 8 regions, 24 districts, 116 wards and passes near an estimated 231 villages and hamlets. The main livelihood is from agriculture and most settlements are concentrated along national and secondary roads. Settlements often have a central trading place.

The Wasukuma are the majority ethnic group in the northern districts of Kahama, Mbogwe, Bukombe and Chato, while the Wanyamwezi have the largest representation in the west-central district of Nzega. The Wamaasai are the majority ethnic group in Kiteto District. The dominant religions are Christianity and Islam, often mixed with traditional beliefs.



THE MAIN LIVELIHOODS IN THE AREA OF INFLUENCE ARE BASED ON SUBSISTENCE AGRICULTURE



The population is rapidly increasing, causing pressure on natural resources and social services. It is also young and highly mobile. Regions such as Geita, Tabora and Shinyanga experience high levels of immigration. Tanzania shares borders with eight other countries and is sensitive to people moving in from neighbouring nations. Tanzania has a long history of accepting refugees fleeing conflict in the Great Lakes region; future conflict in this region or in any of Tanzania's neighbouring countries could cause more people to move into the country.

Males are more literate than females in the area of influence, a trend which is in-line with national literacy levels. Urban districts have higher adult literacy rates for both males and females than rural districts. School attendance rates are improving, although educational services face several challenges, including lack of trained teachers, equipment and buildings.

National Economy

Tanzania's economy is one of the fastest-growing in Africa and the world. Gross domestic product (the total value of goods produced and services provided in a country during one year) increased by 5–8% per year from 2007 to 2015. The Tanzanian economy is diversified compared to other (more resource-rich) African countries. Agriculture dominates the economy, accounting for 85% of exports and employing 65–80% of the workforce. Tanzania's main exports by value are gold, tobacco and sesame seeds.

Government policies during 2015 and 2016 focused on continuing to implement the Five Year Development Plan, with emphasis on the completion of schemes to provide electricity and clean water in rural areas and developing the workforce's skills.

Tanzania reported a very low unemployment rate of 3.9% in 2013, and a high percentage, 78.6%, of people working (65% among 15–24 year-olds). Most people are self-employed and many are poor.

Local Economy

In the area of influence, trade in retail merchandise and agricultural produce, and provision of services (including hospitality) play an important role. Local economic activities are predominantly small-scale and informal. Challenges faced by small businesses include lack of entrepreneurial skills, unreliable electricity supply, high transport costs and weak cash flow. The Five Year Development Plan aims to improve access to energy in rural areas to encourage business growth. The government is also developing strategies to enhance entrepreneurial skills at all levels.

Land-based Livelihoods

The main livelihoods in the area of influence are based on subsistence agriculture (crop farming, moving animals across pasture and sedentary livestock farming), small-scale mining and the use of natural resources.

Most farming activities are small-scale and characterised by low-input, low-output family farming with trading of surplus crops. Crop production is mostly rain-fed. The challenges faced by households engaged in crop farming include limited access to alternative sources of income, and lack of education, skills and experience.



Livestock rearing occurs in all potentially affected communities and is mainly a subsistence activity. The main livestock animals are cattle, goats, sheep, poultry, pigs and donkeys. Key challenges include the lack of livestock support services and veterinary centres. Nomadic livestock farming also occurs and is a distinct feature of the livestock sector in Tanzania. Grazing of pastures occurs across several districts including Muleba, Bukombe, Nzega, Igunga, Iramba, Hanang, Kiteto, Kondo, Kilindi and Handeni Township. The number of people involved in moving animals across pastures is decreasing with a reduction in grazing land, the extension of game reserves and government campaigns.

Small-scale mining in Tanzania focuses mainly on high-value minerals such as gold and gemstones. Other minerals extracted include salt, limestone, kaolin and gypsum. It is difficult to determine the numbers of people involved since this kind of mining is informal and the operations are transient. Women and men whose sole livelihood depends on small-scale mining have high sensitivity as they have no access to land for farming or livestock as an alternative livelihood. Children involved in mining have very high sensitivity since they may be exposed to safety risks and may lack access to education.

Natural resources play a vital part in the subsistence of rural communities, providing energy for cooking, food security, construction materials for shelter, medicine and income. Key challenges for natural resource users includes a loss of habitats through clearing of vegetation and climate change. Female firewood collectors and wild food users have high sensitivity.

River, Lake and Marine-based Livelihoods

Marine and inland fisheries are small scale and fishing is mostly a subsistence activity. There is increasing pressure on inland fish resources owing to crop failures caused by drought and floods, while coastal communities rely heavily on fishing and collecting owing to a lack of alternative livelihoods. Fish stocks are reducing to unsustainable levels because of overfishing. Major challenges for fisherfolk include low wages and a lack of access to financial institutions, and the high price and the poor quality of fishing equipment. Fisherfolk therefore have a very high sensitivity as they receive low wages and a small percentage of fish caught compared to the boat owners. Women engaged in the processing and selling of fish and women engaged in intertidal gleaning (collecting) activities have very high sensitivity.



Land and Property

There are three land categories in Tanzania: village land (within the boundaries of a village and managed by a village council), reserved land (set aside for forest, parks and nature reserves) and general land. Most is village land.

The Land Act provides the legal framework for land rights, recognises customary tenure and empowers local governments to manage village land. This framework provides two main processes for securing land rights:

- In rural areas, the limits may be set for village land and plans for its use created to get a 'certificate of village land'. Once a village has this certificate, the people living within the village may apply for certificates of customary rights of occupancy.
- In urban areas, people may apply for certificates of rights of occupancy.

To acquire certificates of customary rights of occupancy and certificates of rights of occupancy, the land holders must have the boundaries of their lands mapped and their rights recorded and registered.

Villagers have a customary right of occupancy for village land under customary law or they may have received it as an allocation from the village council.

Customary rights of occupancy can be held individually or jointly, last forever and are inheritable, and may be transferred within the village or to outsiders with permission of the village council. Village land allocations can include rights to grazing land, which are generally shared.

Holding a land deed (including the certificates mentioned above) ensures compensation if land is taken.

However, holding land deeds is rare in rural Tanzania. Many villages have not had the limits of their land set, do not have approved land use plans and certificates of village land, which means that there is no basis for issuing certificates of customary rights of occupancy to individual villagers. Less than 10% of the population has formal land ownership certificates.

Land and property sensitivity is ranked as potentially high for pastoralists, who depend on access to land and water sources to move livestock, and youth, who have limited access to land outside their customary rights. Small-scale miners, land users in protected areas and landowners without formal title deeds may not be eligible for compensation and as such are ranked as potentially sensitive. Female headed households are particularly vulnerable because of long standing discrimination that excludes women from owning, inheriting and controlling land. As such female-headed households are ranked as potentially very high sensitivity.



Many land conflicts exist, and most landowners are vulnerable as they lack formal title deeds. There is also an absence of management plans and a trend of village land being purchased by outsiders.

Workers' Health, Safety and Welfare

Many companies in Tanzania have no previous exposure to basic health and safety standards. It is estimated that less than 5% of the working population has access to occupational health and safety services. Workers active in informal economic sectors typically receive no occupational health and safety training and hazards are not identified by their employers. Baseline data revealed a low awareness level of health, safety and workers' rights.

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

Social Infrastructure and Services

Radio is the main means of receiving information, although mobile phones and the internet are becoming increasingly important for exchanging information. Rural electrification is still low, limiting general development. Waste management, particularly the disposal of liquid waste, is a challenge in Tanzania.

Social infrastructure and services sensitivity is ranked as low for media as all households have access to one or more media information sources. Project affected communities are ranked as moderately sensitive receptors for electricity as most do not have access to the electricity grid and rely on other means for cooking and lighting. Households without mobile phones and internet access are ranked as moderately sensitive receptors as they may not receive information shared through these media platforms.

Community Health

Most people living in the area of influence depend on the formal health care system. This dependence is attributed to ongoing 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 a nationwide increase in non-communicable diseases (those which are not caused by infectious agents), particularly hypertension, cardiovascular disease and diabetes, which has been linked to urbanisation and associated lifestyle changes. Chronic (long-standing) malnutrition rates have decreased at district level while acute (intense) malnutrition rates have generally remained low and stable at community population level.

There has been a decrease in the burden of diarrhoeal diseases. This is partly attributed to improvements in hygiene behaviour. The potential for cholera, dysentery and typhoid outbreaks remains high in all parts of the area of influence because of underlying challenges in environmental health conditions.

A decrease or stabilisation of human immunodeficiency virus (HIV) prevalence over the past five years was reported in the area of influence and attributed to health education, free condom distribution, increased HIV testing, care and treatment, and a reduction in HIV stigma.

Infectious diseases that can be spread between animals and people remain a risk, in particular those related to people and animals moving into an area. Key to controlling diseases carried by animals, such as malaria, are environmental sanitation, health care services and preventative treatments, and programmes to control animal movements and migration of people.

Community health sensitivity is ranked as potentially high for children, the elderly, pregnant women, people living in crowded areas, those with decreased access to appropriate healthcare facilities, people with poor access to clean water, women headed households, sex workers and those living near to small-scale mine sites. Sensitivity is ranked as potentially very high for people with compromised immune systems.

Community Safety, Security and Welfare

Crime and gender-based violence in Tanzania is increasing. Vulnerable groups include women, children, the elderly, youths, the disabled, land users without title deeds, and hunter gatherers and nomadic groups. However, initiatives to reduce crime rates include government-supported community policing and external programmes such as the Tanzania Social Action Fund (supported by the World Bank) which aims to “enable poor households to increase incomes and opportunities while improving consumption.”

The sensitivity of women in relation to community safety, security and welfare is ranked as very high as cultural attitudes towards them and their role within the household hinder many women. Widow-headed households and the elderly are ranked as very highly sensitive because meeting basic household needs and affording healthcare can be difficult for them. Children are ranked as very highly sensitive, particularly those from poor households and orphans with acquired immune deficiency syndrome (AIDS), who will be less likely to attend school and are more likely to be relied on to perform household tasks. Youths are also ranked as very highly sensitive due to their limited access to productive assets, lack of education and vocational skills, and scarce employment opportunities. Nomadic groups and hunter gatherers are ranked as highly sensitive as they are vulnerable to loss of access to areas where they can graze, hunt and collect wild plants as they have no legal claim on those areas.

Among the various groups in the area of influence, some might be considered as indigenous peoples according to different international criteria even though they are not formally recognised as indigenous in domestic law. In Tanzania, there are the Akie (also known as Ndorobo), Hadza (also known as Hadzabe), Barabaig (also known as Taturu), Burunge, Sandawe and Maasai. These are pastoralists or hunter gatherers. Additional research is being undertaken to identify the potential presence of indigenous peoples.





Traffic

Urban and rural roads outside of the cities are generally unsealed, and their use by pedestrians is common as there is a lack of pavements. Cyclists and boda boda (motorcycle taxis) 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 area of influence, so congestion is rare, except at the border with Uganda and in Dar es Salaam. In other areas of the country, the number of vehicles is relatively low and congestion only occurs when vehicles are held up by pedestrians walking in the road.

The Tanzania National Roads Agency is upgrading unsealed trunk roads that will also be used by the project.

Cultural Heritage

Tangible cultural heritage is defined as objects, sites or structures with archaeological, palaeontological, historical, cultural, artistic and religious value. 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 area of influence is a representative sample and more features are likely to be identified by surveys and further consultations with local communities before and during construction.

There are no known nationally or internationally recognised critical cultural heritage sites, as defined by the International Finance Corporation, within the area of influence.

Onshore archaeological sites have been identified, including those associated with pottery, stone tools, rock-art and evidence of iron working.

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 ancestors, traditional healing and medicine, meeting places and sacred rivers.

Offshore, there are no tangible or intangible cultural heritage sites within the area of influence.

Climate

Tanzania is vulnerable to increased climate variability and climate change. For example, the severity and frequency of extreme events such as droughts and floods are projected to increase. Tanzania has low levels of greenhouse gas emissions, estimated at 5.5 tons of carbon dioxide equivalent per person for 2014, totalling absolute emissions of 290 million tons of carbon dioxide equivalent, which is approximately 0.58% of the world total.

Tanzania has 35.3 million hectares of forests, one of the highest forest covers in eastern and southern Africa. The forests are a carbon sink (taking carbon dioxide out of the atmosphere) and absorb all Tanzania's greenhouse gas emissions and more, making the country an overall greenhouse gas sink.



Ecosystem Services

Biodiversity

The habitats of conservation importance enable people to collect wood for charcoal production and building, timber and other wood fibres for fuel, plants for food and medicinal purposes, and fibres, resins and other materials. The habitats also help to control water flow, the rate of soil erosion, local air quality and local climate. They provide cultural functions too such as sense of place and way of life; spiritual, sacred and religious values; inspiration for culture, art and design; and opportunities to learn. The habitats also provide important refuge, feeding, watering, breeding and nursery areas for land- and water-based wildlife.

Plants and animals of conservation importance provide services to people such as wild food via hunting, fishing and foraging of plants for personal use or trade. Predatory birds and large mammals provide pest control and regulate living systems, while certain animals, particularly large mammals and their associated habitats, can be vital for wildlife tourism. Plants and animals, and their habitats, can also inspire culture, art and design, and create opportunities for learning.

Physical Environment

The condition of the soil can control its erosion and soil can provide aggregate for construction.

Rivers and lakes provide water for 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 help to control floods by slowing water, storing it on floodplains, and transmitting it relatively slowly downstream to reduce peak flows. Watercourses also help to regulate water quality, particularly where they are vegetated.

Groundwater is an important supply of freshwater for community use. It also plays an important supporting role for water-based and riverbank habitats and wildlife.

People can benefit from a sense of wellbeing from living in an attractive landscape. Stakeholders did not perceive the proposed project infrastructure as a negative visual intrusion in the landscape.

Marine Environment

Marine physical processes provide seawater and sediment for use as a building material. They also provide regulating services, for example, beaches and sand banks protecting against wave erosion and providing sustenance for coral reefs and seagrass beds). They support habitats for marine wildlife too and provide transport routes and the opportunity for recreation.

Intertidal and subtidal plants and habitats of conservation importance provide products for building, mangroves for medicinal purposes and a source of fish. They also provide regulating services such prevention of erosion, and provide cultural benefits. These habitats support a host of marine animals by retaining and recycling nutrients and sediment.

Animals of conservation importance provide food, income and employment through fisheries, and medicinal and genetic resources (the biological variations that keep a population healthy in the long term). Some also regulate carbon storage and sequestration, nutrient and energy cycles, and key habitats. They are important culturally too, and are important for wildlife tourism.

Offshore protected areas provide renewable and non-renewable goods to coastal communities, protect shorelines from erosion and sea level rise, and generate sand for beaches. They help to maintain the biodiversity and genetic richness of the entire coastal ecosystem, supporting habitats and food webs including those involving pelagic (not bottom- or shore-dwelling) and migratory animals. They also are used for recreational purposes.

Socio-economic and Health

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

Crop farming is vital, sometimes providing communities with their only source of food. Livestock rearing is also important, primarily as mitigation against shock events. Land is a vital resource for livestock keeping, grazing, water sources, and it enables the growth of trees for shelter and medicinal herbs. Natural resources such as fuel (firewood and charcoal), wild foods (honeys, insects, mushrooms and bush meat), timber, medicinal plants and grasses are also valuable in terms of providing energy for cooking, construction materials, traditional medicine and income. Fishing has traditionally been important to lakeside and marine communities.

Cultural Heritage

Cultural heritage provides knowledge for understanding the natural environment and ecosystems. It influences social systems and social relations, and offers a sense of place in a complex and changing world. Cultural heritage also helps control the use of land, the resolution of conflicts and the day-to-day performance of the social duties that make local society work.

THE TANZANIAN ECONOMY IS HEAVILY DEPENDENT ON AGRICULTURE, FORESTRY, FISHING AND MINING.



Stakeholder Engagement

Stakeholder engagement is an integral part of the EACOP project and the ESIA process. It is the foundation for developing and maintaining the project's social licence to construct and operate the pipeline. Stakeholder engagement has been undertaken in accordance with the requirements of Tanzanian legislation, international standards and EACOP project principles, protocols and policies for stakeholder engagement.

Stakeholders engaged included: government, civil society, and directly and indirectly affected people and communities, with attention paid to the needs of women and those people who are vulnerable to the potential impacts. It also considered human rights.

The stakeholder engagement process has been tailored to meet the needs of the EACOP project, ESIA process and stakeholders. The plan has been to provide effective engagement throughout the ESIA process based 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, which 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 the understanding of features deemed to be of value by society, impact identification, mitigation measures and potential sources of cumulative impact and impact mitigation
- listening to questions and concerns from stakeholders and ensuring that these are addressed in the ESIA
- conducting pre-submission meetings to consult a sample of potentially impacted local stakeholders, before the submission to the National Environment Management Council to acquire its 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 and grievance management processes. 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.

A common concern during community consultation was the compensation process, including timely compensation for land or properties, resettlement and livelihood restoration. An additional concern was the management of grievances associated with land acquisition and how this would be handled.

Stakeholders were informed that the project will manage land acquisition by developing resettlement-action and livelihood-restoration plans, and that compensation will be provided in accordance with national law and international standards, and before construction begins. Concerns about the resettlement process were given to the project team managing the ongoing resettlement planning activities.

Concerns were raised about the impacts of people attracted to the area by potential project-related opportunities (in-migration) and how this potential influx would be managed. 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 for either direct or indirect project opportunities.

Stakeholders raised concerns about health impacts, particularly HIV and AIDS, the lack of capacity of medical facilities and measures to protect children from road traffic accidents. In

response, information was provided about the health impact assessment included in the ESIA and the community health, safety and security plan containing the appropriate mitigation. 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, and that these camps would be closed and that interactions with local communities would be discouraged. The development and implementation of a community HIV and AIDs programme was discussed with stakeholders. Information about the medical emergency response plan and health and safety programmes to prevent and respond to accidents was also provided.

Stakeholders also raised concerns about increased cost of living due to the project and about employment and procurement opportunities for local people, particularly youth. In response, stakeholders were informed that a transparent recruitment strategy would be developed and shared with communities. They were also told about the plan developed to maximise the purchase of goods and services from within Tanzania and the procurement and supply chain management plan which reinforces the use of local workers and suppliers.

Physical Environment

Stakeholders raised concerns about potential impacts on access, increased demand and quality of water, air quality and noise pollution. In response, they were informed about the water assessments being undertaken by the project and the associated measures to address the findings, and about the pollution prevention plan that will minimise impacts from air and noise pollution.

STAKEHOLDERS WERE INFORMED THAT THE PROJECT WILL MANAGE LAND ACQUISITION BY DEVELOPING RESETTLEMENT-ACTION AND LIVELIHOOD-RESTORATION PLANS, AND THAT COMPENSATION WILL BE PROVIDED.





Biodiversity

Stakeholders raised concerns about potential impacts on ecologically important habitats, particularly the Swaga Swaga Game Reserve. They also emphasised the presence of protected species in the project area of influence. Tanga Municipal Council stakeholders stressed that species such as coelacanth, dugong, humpback whales, bottlenose dolphins and turtles are present in the marine environment. Stakeholders were informed about measures, including terrestrial and marine management plans, which will be implemented to ensure that the plants and animals (biodiversity) is not affected if the pipeline passes through protected areas.

Project and ESIA-Related Matters (Including Stakeholder Engagement)

Questions were asked about the pipeline route and characteristics, camp locations and their potential use after construction, the project lifespan and measures to ensure the safety and security of the pipeline. Stakeholders also asked questions about a marine emergency response plan. In response, stakeholders were informed about the pipeline route selection process and the pipeline engineering design, how the pipeline will pass under water courses, and that a permanent 30-m wide right-of-way is required for the pipeline. Stakeholders were advised that negotiations on the location and final use of the camps are ongoing between the Government and project. They were also assured that emergency and oil-spill response plans will be prepared, and it was emphasised that safety is a priority for the project.

Further engagement was recommended by stakeholders at national, regional, district, ward and community level, and throughout the project lifecycle. Stakeholders were advised that the project intends to engage stakeholders throughout the ESIA process, other preliminary studies and construction activities. Recommendations for stakeholder engagement in the operational phase of the project were noted and will be implemented. Plans for ongoing stakeholder engagement are described below.

Grievance Procedure

The EACOP project has established a nonjudicial grievance procedure to respond to stakeholders' concerns and to facilitate resolution of stakeholders' grievances. This 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 the EACOP project's community liaison officers and grievance administrators.

Ongoing Stakeholder Engagement

The project stakeholder engagement team will continue to engage with key 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 project life. The project will also seek to build partnerships with nongovernmental organisations, community liaison officers 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, community liaison officers and grievance officers.

The resettlement action plan team will continue stakeholder engagement throughout the resettlement process.

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

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

Impacts – Normal Operations

A primary project objective is to design, construct, operate and decommission the pipeline and its aboveground installations with minimal risk, injury or harm to workers, host communities and the environment that support these people.

Potential impacts on biodiversity, the physical environment, the marine environment, people's socio-economic and health status, archaeology and cultural heritage during the construction and operation phases were considered during the ESIA.

The key impacts considered, with no priority in the ordering, include:

- **biodiversity:**
 - direct and indirect impacts on legally protected areas and internationally recognised areas that have species of conservation importance, including the Minziro Nature Forest Reserve, Burigi-Biharamulo and Swaga Swaga Game Reserves and the Talamai Open Area
 - terrestrial habitat loss and disturbance to species of conservation importance such as Itigi-like thickets
 - aquatic habitat loss and disturbance to fish and aquatic macro-invertebrate species of conservation importance inhabiting the Kagera, Pangani and Sigi Rivers, Lake Victoria and Wembere Wetlands, and ephemeral watercourses

- **terrestrial physical environment:**

- change to the quantity and quality of surface and groundwater used for drinking water and agricultural use
- change in the air quality near the pumping stations that generate power
- increase in noise near the pipeline and aboveground installations during construction and near the aboveground installations during operation

- **marine environment:**

- destruction of coral during construction of marine facilities
- change to marine noise during the construction and operation of marine facilities and the related impacts on marine animals

- **socio-economic and health environment:**

- competition over employment opportunities
- loss of grazing land
- loss of access to small-scale mining
- loss of, or restriction of access to, existing fishing grounds, transit routes, fish landing sites and market sites due to a Marine Exclusion Zone
- displacement of fishing (from loss of, or restriction of access to, grounds) into adjacent fishing areas
- loss caused by land acquisition
- occupational health and safety incidents causing diseases, injuries and mortality
- transmission of communicable diseases
- damage, disturbance or disruption of access to cultural heritage.

The pre-mitigation significant impacts assessed and associated management plans are summarised in Table 1.

TABLE 1: Pre-mitigation Significant Impacts

VALUED ENVIRONMENTAL COMPONENT	PRE-MITIGATION SIGNIFICANT IMPACTS	MANAGEMENT PLANS
Biodiversity		
Habitats of Conservation Importance	None ¹	
Animals and plants of conservation importance	<u>Generic</u> Disturbance or harm to wildlife	Biodiversity management plan Labour management plan Community health, safety and security plan Stakeholder engagement plan
	Temporary habitat fragmentation causing disrupted animal movement during construction of the right of way	Biodiversity management plan
	<u>Location Specific</u> Burigi–Biharamulo Game Reserve and Key Biodiversity Area Loss of breeding and foraging habitat Facilitated access leading to habitat loss	Biodiversity management plan Reinstatement plan Community health, safety and security plan Labour management plan
	Itigi-like thicket Loss of endemic and or range-restricted plants	Biodiversity management plan
	Main camp and pipe yard 12 Facilitated access leading to habitat loss	Biodiversity management plan
	Talamai Open Area and pressure reduction station 1 Loss of breeding and foraging habitat Facilitated access leading to habitat loss	Biodiversity management plan Reinstatement plan Biodiversity management plan Reinstatement plan Labour management plan Community health, safety and security plan Stakeholder engagement plan
	Talamai Open Area and Kitwai Game Controlled Area (part of the Masai Steppe Important Bird Area) Loss of breeding and forage habitat to animals of conservation importance	Biodiversity management plan Reinstatement plan
	Main camp and pipe yards 13 and 14 Loss of breeding and foraging habitat Disturbance	Biodiversity management plan Reinstatement plan Project induced in-migration management plan Pollution prevention plan

¹ Management plans and mitigation further reduced the predicted impacts

VALUED ENVIRONMENTAL COMPONENT	PRE-MITIGATION SIGNIFICANT IMPACTS	MANAGEMENT PLANS
Biodiversity		
Animals and plants of conservation importance	Sigi River Loss of high and very high sensitivity plants	Biodiversity management plan Reinstatement plan
	Marine storage terminal Loss of high and very high sensitivity plants Habitat loss	Biodiversity management plan Reinstatement plan
Legally protected, internationally or nationally recognised onshore areas	<u>Location Specific</u> Burigi–Biharamulo Game Reserve and Key Biodiversity Area Loss of ecological function and integrity of protected site through impacts on plants and animals, and habitats	Biodiversity management plan Reinstatement plan
Physical Environment		
Soil	None	
Surface water	None	
Groundwater	None	
Landscape	None	
Air quality	Pumping stations 3 and 5 Increased NO ₂ concentrations Increased PM ₁₀ and PM _{2.5} concentrations	Pollution prevention plan
Acoustic	Pumping stations 3 and 5 Increase in baseline noise environment Marine storage terminal Increase in baseline noise environment	Pollution prevention plan
Socio-economic and Health Environment		
Local economy (non-land-based livelihoods)	<u>Location Specific</u> Tanganyika Competition over employment opportunities Putini and Chongoleani Dissatisfaction arising from unmet expectations Competition over employment opportunities	Project-induced in-migration management plan Stakeholder engagement plan

VALUED ENVIRONMENTAL COMPONENT	PRE-MITIGATION SIGNIFICANT IMPACTS	MANAGEMENT PLANS
Socio-economic and Health Environment		
Land-based livelihoods	<p><u>Generic</u> Permanent loss of land used for crop farming Permanent loss of access to artisanal mining sites</p> <p><u>Location Specific</u> Project affected communities near all the main camp and pipe yards Permanent loss of grazing land</p> <p>Zongomera and Kimana villages Permanent loss of access to artisanal mining sites</p> <p>Mbogwe district (KP583.9 and 639.7), Kahama Township Authority, Geita district Permanent loss of access to licensed mining concessions</p> <p>Project affected communities near all pumping stations and the marine storage terminal Permanent loss of grazing land</p>	Pollution prevention plan Resettlement action plan Monitoring and reporting plan
River-, lake- and marine-based livelihoods	<p><u>Location Specific</u> Mleni mtaa, Mabokweni mtaa, Helani hamlet, Putini mtaa and Chongoleani mtaa Loss of, or restriction of access to, existing fishing grounds, transit routes, fish landing sites and market sites due to the Marine Exclusion Zone Loss of, or restriction of access to, intertidal gleaning sites due to the Marine Exclusion Zone Displacement of fishing effort (from loss of, or restriction of access to, fishing grounds) into adjacent grounds</p>	Resettlement action plan (includes a marine livelihoods restoration plan) Stakeholder engagement plan Monitoring and reporting plan
Land and property	<p><u>Generic</u> Permanent loss of private land due to project land acquisition Permanent loss of physical structures due to project land acquisition Permanent loss of local enterprises</p>	Occupational health, safety and security plan Community health, safety and security plan Labour management plan Pollution prevention plan Monitoring and reporting plan

VALUED ENVIRONMENTAL COMPONENT	PRE-MITIGATION SIGNIFICANT IMPACTS	MANAGEMENT PLANS
Socio-economic and Health Environment		
Land and property	<p><u>Location Specific</u> Project affected communities near all the main camp and pipe yards and coating facility Permanent loss of private land due to project land acquisition Land speculation by third parties</p> <p>New disputes and exacerbation of pre-existing disputes and conflict around land and property Permanent loss of physical structures due to project land acquisition</p> <p>Masusu New disputes and exacerbation of pre-existing disputes and conflict around land and property</p> <p>Project affected communities between KP1380 and KP1410 Permanent loss of private land due to project land acquisition New disputes and exacerbation of pre-existing disputes and conflict around land and property Permanent loss of physical structures due to project land acquisition</p>	<p>Resettlement action plan Stakeholder engagement plan Community health, safety and security plan Monitoring and reporting plan.</p> <p>Resettlement action plan Stakeholder engagement plan Occupational health, safety and security plan Community health, safety and security plan Labour management plan Pollution prevention plan Monitoring and reporting plan</p> <p>Resettlement action plan Stakeholder engagement plan Community health, safety and security plan Monitoring and reporting plan</p>
Workers' health, safety and welfare	<p><u>Generic</u> Other occupational health and safety incidents causing diseases, injuries and mortality</p>	<p>Community health, safety and security plan Occupational health, safety and security plan Labour management plan Transport and road safety management plan</p>
Social infrastructure and services	<p><u>Generic</u> Deterioration of road conditions</p>	<p>Infrastructure and utilities management plan</p>
Community health	<p><u>Generic</u> An increase in the burden of disease along the project's transport corridors caused by drivers spreading communicable diseases</p>	<p>Community health, safety and security plan Occupational health, safety and security plan Pollution prevention plan Waste management plan Stakeholder engagement plan</p>

VALUED ENVIRONMENTAL COMPONENT	PRE-MITIGATION SIGNIFICANT IMPACTS	MANAGEMENT PLANS
Socio-economic and Health Environment		
Community health	<p><u>Location Specific</u> Project affected communities near all the main camp and pipe yards The transmission of communicable diseases Outbreaks of infectious diseases</p> <p>The transmission of communicable diseases between the project's externally contracted workforce and project affected communities</p> <p>Reduction in the availability of potable water</p> <p>Project affected communities near pumping stations 3 and 5, and the marine storage terminal Increased risk of respiratory diseases due to project activities</p>	<p>Community health, safety and security plan Occupational health, safety and security plan Natural resource management plan Pollution prevention plan Waste management plan Stakeholder engagement plan</p> <p>Project-induced in-migration management plan Community health, safety and security plan Stakeholder engagement plan</p> <p>Project-induced in-migration management plan Community health, safety and security plan Occupational health, safety and security plan Resettlement action plan Natural resource management plan Pollution prevention plan Waste management plan Stakeholder engagement plan</p> <p>Pollution prevention plan</p>
Community safety, security and welfare	<p><u>Generic</u> Conflict between project affected communities and project security personnel</p> <p><u>Location Specific</u> Mleni mtaa, Mabokweni mtaa, Helani hamlet, Putini mtaa and Chongoleani mtaa (KP1429-1442.5) Conflict between project affected communities and project security personnel</p>	<p>Community health, safety and security plan Stakeholder engagement plan.</p>
Tangible and intangible cultural heritage	<p><u>Generic</u> Damage, disturbance or disruption of access of unknown tangible cultural heritage, such as evidence of previous settlement and graves. Damage, disturbance or disruption of access of unknown intangible cultural heritage, such as meeting places, sacred natural sites, rivers or ceremonial ways, traditional dance, rituals, traditional healing and syncretism Damage or disturbance of tangible cultural heritage Damage or disturbance of intangible cultural heritage</p>	<p>Cultural heritage management plan</p>

The following section presents the significant residual impacts remaining after proposed mitigation is applied. Beneficial project impacts are also described. All potentially significant ecosystem services related impacts are addressed by the impact assessments for each valued feature and the associated management plans.

Beneficial Impacts

There are potential beneficial project impacts, mainly relating to socio-economic matters. Where possible, measures will be taken to enhance the benefits to local people, and the local and national economy (Table 2).

TABLE 2: Beneficial Impacts

BENEFICIAL IMPACTS	PHASE	ENHANCEMENT MEASURE
Biodiversity		
Permanent change of land use in agricultural areas on the right-of-way from crops to grassland will have a direct biodiversity benefit.	Operation	None
Socio-economic and Health		
Contribution to economy from investment.	Construction and operation	None
Generation of national and local employment opportunities.	Construction and operation	The procurement, supply-chain-management, local-content, labour-management and stakeholder engagement plans
Provision of training and skill development opportunities for local workers.	Construction and operation	The procurement, supply-chain-management and labour-management plans
Opportunities for national and local businesses through project procurement.	Construction and operation	The procurement, supply-chain-management and labour-management plans
Improved road conditions due to TANROAD road widening and resurfacing, benefiting business owners and public transport users, and improving ability to sell crops to nearby markets for farmers and traders.	Construction and operation	The infrastructure, utilities-management, procurement, supply-chain-management, monitoring-and-reporting and stakeholder-engagement plans
Improvement in the health and safety of employees from disease awareness and reduction programmes.	Construction and operation	The occupational health, safety and security plan
Conversion of the main camp pipe yard structures into community facilities, leading to improved service provision for local communities	Construction and operation	None
Increased knowledge of tangible and intangible cultural heritage.	Construction and operation	The cultural heritage management plan
Employment of people to survey and investigate cultural heritage affected by the project.	Construction and operation	The cultural heritage management plan



Significant Residual Project Impacts

During the impact assessment, measures were proposed to mitigate potential project impacts. Table 3 shows the number of generic and location-specific impacts assessed and mitigation measures identified for each group of features considered to be environmentally or socially important by society. The significance of impacts was then re-assessed. The significance of any residual project impacts (after mitigation) is presented in Table 4 with the reasons why they remain significant.

Climate

Direct operational emissions in Tanzania will range between 201–282 ktCO₂e/a throughout the 25-year life, which represents around 0.2–0.3% of Tanzania’s total greenhouse gas emissions in 2030. The contribution of the EACOP project to national emissions is therefore low and will not affect Tanzania’s ability to meet its emission reduction targets published as part of the United Nations Framework Convention on Climate Change’s Paris Agreement.

Transboundary Impacts

There are no significant residual transboundary impacts identified.

Cumulative Impacts

One potential cumulative impact remains significant after mitigation measures have been implemented. This relates to an access road to a pressure reduction station and a construction camp, and a TANROADS national road upgrade between Handeni and Singida, and the combined effect this may have on high sensitivity animals of conservation interest in the Talamai Open Area.

TABLE 3: Number of Impacts Assessed and Mitigation Measures

	GENERIC IMPACTS	GENERIC IMPACT MITIGATION MEASURES	LOCATION-SPECIFIC IMPACTS	LOCATION-SPECIFIC IMPACT MITIGATION MEASURES
Biodiversity	33	53	33	31
Physical Environment	26	40	338	41
Social	59	64	479	58

TABLE 4: Residual Impacts

SIGNIFICANT RESIDUAL IMPACTS	PHASE	WHY THE IMPACT REMAINS SIGNIFICANT AFTER MITIGATION
Biodiversity – Plants and Animals of Conservation Importance		
Loss of breeding and foraging habitat for the International Union for Conservation of Nature critically endangered white-backed vulture and endangered steppe eagle and ashy red colobus monkey, and keystone animals such as raptors, owls, lion, leopard in Burigi-Biharamulo Game Reserve and Key Biodiversity Area.	Construction and operation	The loss of 73 ha of habitat, from the construction of the pipeline through 7.9 ha of old growth forest, which supports plants and animals of conservation importance, will have impacts lasting a long time as the forest will take a long time to return to its original condition. The impacts will also be of national extent on very high sensitivity plants and animals. A biodiversity action plan incorporating enhancement and conservation measures will be developed and implemented.
Use of upgraded access road from pressure reduction station 1 and main camps and pipe yards 13 and 14 into the Talamai Open Area and Kitwai Game Controlled Area by people not working for the project, with the access that the road gives leading to habitat loss and disturbance of birds and mammals in the Talamai Open Area through increased deforestation, noise, lighting, hunting and human activity during construction and operation.	Construction and operation	The construction of pressure reduction station 1, its new road and the construction camps are still likely to attract people to the area who will cause significant impacts on plants and animals of conservation importance in the Talamai Open Area and Kitwai Game Control Area. This residual impact is considered to last a long time as the road will be permanent, of national extent and effect plants and animals of high sensitivity. A biodiversity action plan incorporating enhancement and conservation measures will be developed and implemented. As the project cannot avoid or fully mitigate for impacts associated with the development within the Talamai Open Area, further enhancement and conservation measures will be developed and implemented.
Habitat loss from site clearance during pipeline and marine storage terminal construction in the East African Coastal Forest biodiversity hotspot for endemic and migratory species.	Construction	Construction of the marine storage terminal and the sterile zone around it will cause 73 ha of habitat loss in an area which supports plants and animals of conservation importance. This residual impact is considered to last a long time as the habitat loss will be permanent, of national extent and effect plants and animals of high sensitivity. A biodiversity action plan incorporating enhancement and conservation measures will be developed and implemented. This will include a site-specific vegetation clearing protocol that considers the potential for tree-roosting bats.
Marine Environment – Fauna Species of Conservation Importance		
Sedimentation causing smothering of coral on the Kwawa Reef with lethal and sublethal effects on coral and reef health.	Construction	As corals are highly sensitive, with some of the corals present intolerant to sedimentation, the impact remains significant. A biodiversity action plan will include marine conservation measures, which will be developed and implemented.
Underwater noise from construction activities causing physical or physiological effects (mortality and potential injury, recoverable injury and temporary hearing loss) in various fish, including the International Union for Conservation of Nature critically endangered Napoleon wrasse, and mortality and potential injury to fish eggs and larvae.	Construction	The Napoleon wrasse is critically endangered making it very high sensitivity. The impact will last a long time and current project commitments will not mitigate the magnitude of the impact on this fish. The biodiversity action plan will include marine conservation measures, which will be developed and implemented.
Marine Environment – Legally Protected, Internationally or Nationally Recognised Areas		
Underwater noise from the construction activities causing physical or physiological effects in the Napoleon Wrasse, influencing fish community structure and populations (cited as an important nursery ground), a designated feature of the Tanga Coelacanth Marine Park, which could affect the integrity of the protected area.	Construction	The role and abundance of Napoleon wrasse within the fish community structure of the Tanga Coelacanth Marine Park is unknown. However, a change in the fish community structure and population is a significant effect to the integrity of the Tanga Coelacanth Marine Park. Marine conservation measures developed to reduce the impact to Napoleon wrasse will also reduce the impact on the integrity of the protected area.

The national road is outside the Talamai Open Area boundary but the access roads to the pressure reduction station and camp depart from this main road. The operation of the national road and the EACOP project access roads to these facilities, together, have the potential to cause increased pressure on natural resources in the Talamai Open Area from increased human access and activity. The restoration of the construction camp area, which is outside the Talamai Open Area, once construction is complete will remove the inducement for people to come to the area. However, as the access road to pressure reduction station is permanent and will provide access directly into the Talamai Open Area, the cumulative impacts are still considered significant. When enhancement and conservation measures are developed and implemented, the cumulative impacts are expected to be reduced.

No marine or transboundary cumulative impacts have been identified.

Potential Impacts – Unplanned Events

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

The project has completed a technological risk assessment during front-end engineering design in accordance with the EACOP project health, safety and environment risk assessment methodology.

Risk assessment has been undertaken to inform the design process and 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 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 include management plans and procedures, such as oil-spill contingency, spill management and response, and community health, safety and security plans.

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 systems and procedures
- emergency response planning.

The project has considered the opportunities to reduce risk during construction and operation throughout the design process and will have in place a health, safety and environment management system with which contractors will be required to comply during construction.

Unplanned Events - Pipeline and the Storage Tank Facility

During the construction phase, unplanned events include:

- traffic accidents
- fires
- horizontal directional drilling mud breakout
- damage to third-party assets
- release of diesel from fuel storage tanks at the main camp pipe yards and construction sites
- release of chemicals stored at the coating facility
- release of hydrotest water during commissioning.

During operation, the unplanned loss of oil from the pipeline, whether due to geophysical hazards, deliberate sabotage, corrosion or any other reason is the main significant risk.

Oil spill modelling has been conducted for the pipeline and storage tank facility to assess the risks associated with oil loss during operation.

A summary of the unplanned events with respect to the pipeline and storage tank facility, their potential impacts, and the key mitigation measures which will be in place to prevent or manage impacts, is provided in Table 5.

TABLE 5: Summary of Unplanned Events – Pipeline and Storage Tank Facility

UNPLANNED EVENT	POTENTIAL IMPACT	MANAGEMENT PLAN(S)	LIKELIHOOD OF EVENT (LOW, MEDIUM OR HIGH)
Construction			
Traffic accidents	Vehicle collision causing injury or mortality to member of public or workforce or livestock, or physical damage to a community asset or structure or project asset	Transport and road safety management plan	Medium to High
Traffic accidents	Vehicle collision leading to spillage of transported fuel or chemical and causing contamination of soil and or water, with toxicity affecting living organisms	Emergency preparedness and response plan	Medium to High
Fire	Impact to valued environmental and social components including biodiversity, community safety, security and welfare and land and property (for example, sensitive habitats, local community assets and the health of local community residents)	Emergency preparedness and response plan	Low
Breakout of drilling mud at horizontal directional drilling crossings	Downstream impacts on water quality at the Kagera (KP324) and Sigi (KP1424) Rivers	Water management plan	Medium
Damage to third-party assets	Physical damage to third-party property	Transport and road safety management plan Infrastructure and utilities management plan	Low
Diesel release from oil storage tanks at the main camp pipe yards and construction sites	Diesel release causing contamination of soil and or water, with toxicity affecting living organisms	Pollution prevention plan Water management plan Emergency preparedness and response plan	Low (for main camp pipe yards) Medium (for construction sites)
Chemical release from the coating facility	Spillage, fire and or toxic release from the bulk storage of chemicals required for the coating process	Emergency preparedness and response plan	Medium
Loss of hydrotest water during commissioning	Localised erosion	Emergency preparedness and response plan	Low
Traffic accidents	Vehicle collision causing injury or mortality to member of public or workforce or livestock, or physical damage to a community asset or structure or project asset	Transport and road safety management plan	Low
Traffic accidents	Vehicle collision leading to spillage of transported fuel or chemical and causing contamination of soil and or water, with toxicity affecting living organisms	Emergency preparedness and response plan	Low
Fire	Impact to valued environmental and social components including biodiversity, community safety, security and welfare and land and property (for example, sensitive habitats, local community assets and the health of local community residents)	Emergency preparedness and response plan	Low

UNPLANNED EVENT	POTENTIAL IMPACT	MANAGEMENT PLAN(S)	LIKELIHOOD OF EVENT (LOW, MEDIUM OR HIGH)
Operation			
Geophysical hazards	Rupture of pipeline and or slope failure leading to land-slides, and oil spills	Emergency preparedness and response plan	Low
Sabotage	Deliberate damage with environmental and social impacts	Emergency preparedness and response plan	Medium (political) – Low (theft)
Modelled oil spill from pipeline or aboveground installations	Impact to surface water via migration of oil components dissolved in groundwater	Emergency preparedness and response plan	Low
Modelled oil spill from pipeline or aboveground installations	Impacts to groundwater via migration of oil components dissolved in groundwater	Emergency preparedness and response plan	Low
Modelled oil spill from pipeline or aboveground installations	Impacts to soil from non-aqueous phase liquids in the unsaturated zone	Emergency preparedness and response plan	Low
Modelled oil spill from pipeline	Oil dispersal on surface water following leak at pipeline crossings	Emergency preparedness and response plan	Low
Large oil leak from storage tanks at the marine storage terminal	Impact to underlying soil and groundwater environment	Emergency preparedness and response plan	Low

Unplanned Events at the Trestle and Loading Platform

Unplanned events have been identified and assessed for:

- activities in all phases:
 - marine traffic accidents
 - fires
- construction and commissioning phase activities:
 - vessel collision with other vessels
 - vessel collision with marine mammals
 - damage to third party assets
 - release of diesel from fuel storage tanks on construction vessels
 - release of hydrotest water during commissioning
- operation
 - vessel collision with load-out facility
 - oil spill scenarios
 - spill from the loading arm
 - loss of the product from the pipeline along the trestle.
 - potential external causes of a pipeline breach:
 - sabotage
 - modelling of oil spills at sensitive locations.

If an unplanned event does occur during the project's lifetime, including the construction phase, the EACOP project's response planning will be consistent with international best practice and designed to minimise the consequences of any such accident.

A summary of the unplanned events, their potential impacts, key management plans and risk is provided in Table 6.



TABLE 6: Summary of Unplanned Events – Trestle and Loading Platform

UNPLANNED EVENT	POTENTIAL IMPACT	KEY MANAGEMENT PLANS	RISK
Construction			
Vessel collision with other vessels	Collisions between two construction vessels or between a construction vessel and a fishing or commercial vessel, causing fire or sinking of a vessel potentially resulting in loss of life, disturbance of the seabed and or contamination	Marine stakeholder engagement plan Marine community health safety and security plan Marine vessel management plan Marine pollution prevention plan Marine emergency preparedness and response plan	High (between construction and fishing vessels) Medium (between construction vessels and commercial vessels, and between two construction vessels)
Vessel collision with the load-out facility while under construction	Collisions between construction vessels, fishing vessels or commercial vessels and the load-out facility, potentially causing loss of life or spill of bunker oil with consequences for local community livelihoods, habitats and animals	Marine stakeholder engagement plan Marine community health safety and security plan Marine vessel management plan Marine pollution prevention plan Marine emergency preparedness and response plan	Low (between construction vessels and the load-out facility) Medium (between fishing or commercial vessels and the load-out facility)
Vessel collision with megafauna	Collisions between construction vessels and megafauna (turtles and marine mammals) causing injuries or fatalities to the megafauna	Biodiversity management plan	Low
Vessel collision with divers or snorkelers	Collisions between construction vessels and divers or snorkelers causing injuries or fatalities to the divers or snorkelers	Marine stakeholder engagement plan Marine community health safety and security plan Marine vessel management plan	Medium
Vessel collision with other vessels	Collisions between tankers or tugs and fishing or commercial vessels, causing fire or sinking of a vessel, potentially resulting in loss of life, disturbance of the seabed and or contamination	Marine stakeholder engagement plan Marine community health safety and security plan Marine vessel management plan Marine emergency preparedness and response plan	Low
Vessel collision with megafauna	Collisions between tankers or tugs and megafauna (turtles and marine mammals) causing injuries or fatalities to the megafauna	Marine stakeholder engagement plan Marine community health safety and security plan Marine emergency preparedness and response plan	Low
Vessel collision with the trestle and loading platform	Collision of tankers with loading platform causing an oil spill with consequences for local community livelihoods, habitats and animals	Marine stakeholder engagement plan Marine community health safety and security plan Marine emergency preparedness and response plan	Medium
Sabotage	Deliberate damage with environmental and social impacts	Emergency preparedness and response plan	Medium (political) – Low (theft)
Modelled oil spill release during loading	Impacts to local community livelihoods, habitats and plants and animals	Marine pollution prevention plan Marine emergency preparedness and response plan Terrestrial emergency preparedness and response plan Terrestrial pollution prevention plan	Medium
Modelled oil spill from the pipeline along the trestle	Impacts to local community livelihoods, habitats and plants and animals	Marine pollution prevention plan Marine emergency preparedness and response plan Terrestrial emergency preparedness and response plan Terrestrial pollution prevention plan	Medium

Decommissioning

The project components (the pipeline, pumping and pressure reduction stations, storage tank facility and loading platform), will be decommissioned based on Tanzanian regulations and standards and international standards and protocols.

A decommissioning plan, which includes a social management component that addresses the impact of decommissioning (for example, loss of jobs and 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 returned to the Government. The decommissioning plan will include specific consideration of unplanned events which may occur during decommissioning in line with the EACOP project requirements.

Environmental and Social Impact Management and Monitoring Plans

Based on the Tanzania Environmental Impact Assessment and Audit Regulations, 2005, environmental and social management and monitoring plans have been developed.

The project environmental and social management plan is consistent with the EACOP project code of conduct and the health, safety, security, society and environment policy.

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

Management plans will be prepared to support the implementation of the environmental and social management, and the environmental and social monitoring plans. These plans will contain, as a minimum, the mitigation commitments developed throughout the ESIA and will be prepared for:

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

The following is a list of the management plans that will be developed before construction and operation activities start.

Terrestrial management plans include the:

- 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
- chemical management plan
- horizontal directional drilling management plan
- hydrostatic testing management plan
- rock blasting management plan.

Marine management plans include the:

- biodiversity management plan
- pollution prevention plan
- waste management plan
- natural resource management plan
- cultural heritage management plan
- reinstatement plan
- stakeholder engagement plan
- labour 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
- vessel management plan
- emergency preparedness and response plan
- monitoring and reporting plan
- decommissioning plan.



THE ESIA HAS BEEN PREPARED BY AN EXPERIENCED TEAM WITH EXTENSIVE PIPELINE ENGINEERING, ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT KNOWLEDGE, INCLUDING TANZANIAN PARTNERS

Changes to the project may occur after the preparation and submission of the ESIA. A procedure to manage the changes 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 health, safety, security, society and environment disciplines
- consultation with the National Environment Management Council on the need for amendments to the ESIA permit
- management of change approval process.

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

Cost Benefit Analysis

The main overall benefit of constructing a pipeline to transport 216,000 barrels of oil per day to the world market is the creation of considerable cashflow to the oil producing country of Uganda which will enhance regional economic activity, creating a positive effect in East Africa including generating income for the transit country Tanzania.

Based on the project cost aspects that can be monetised, the project has the potential to provide substantial benefits to Tanzania, nationally and locally, and for many stakeholders, improving their standard of living. There will be costs in terms of environmental and social impacts that are challenging to monetise. However, the project has management plans with mitigative measures funded by project investment to minimise those costs.

Generally, given the relatively few and manageable residual impacts that will be mitigated to a minimum, as much as feasible, and considering the relatively long 1147-km footprint, the overall project benefits, including those for the regional economy, are considered to outweigh the costs.

BASED ON THE TANZANIA ENVIRONMENTAL IMPACT ASSESSMENT AND AUDIT REGULATIONS, 2005, ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLANS HAVE BEEN DEVELOPED.

Recommendations

The ESIA has been prepared by an experienced team with extensive pipeline engineering, environmental and social impact assessment knowledge, including Tanzanian partners with expertise in ESIA development in the Tanzanian oil and gas sector. The team has quantitatively and qualitatively identified and assessed potential interactions between the project and environmental and social features considered important by society in the project area of influence. The recommended measures, consolidated in the environmental and social management plan, which are either incorporated into project design, or completed 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 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 the National Environment Management Council approve this environmental impact statement.

