12 SUMMARY AND RECOMMENDATIONS

This section is equivalent to Section xv, summary and conclusions, of the legislative structure. If in doubt, please refer to Table 1.5-1 Environmental Impact Statement Structure on page 1-5.

12.1 Introduction

This section provides a summary of the environmental and social impact assessment (ESIA) process and provides recommendations.

12.2 Stakeholder Engagement

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

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

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

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

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

- obtaining an understanding of the number and types of stakeholders in the socioeconomic study area

- informing stakeholders about the ESIA baseline studies in the areas traversed by the project and associated infrastructure
- obtaining stakeholder input into the scope of the ESIA, including the development of valued environmental (and social) components (VEC), impact identification, mitigation measures and potential sources of cumulative impact and impact mitigation
- listening to questions and concerns from stakeholders and ensure these are addressed in the ESIA
- conducting pre-submission meetings to consult a sample of potentially impacted local stakeholders, before to the submission to the National Environmental Management Council (NEMC) to acquire their feedback on ESIA findings (impacts and mitigation measures), cumulative impact assessment and mitigation measures.

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

12.2.1 Stakeholder Concerns

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

12.2.1.1 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 a resettlement action plan (RAP) and a livelihood restoration plan (LRP) and that compensation will be provided in accordance with national law and international standards and before construction begins. Stakeholders concerned with the project resettlement process to date were informed that their grievances would be passed onto the project. The project is aware of these concerns and is addressing them as part of the ongoing resettlement planning activities.

Concerns were raised about project induced in-migration (PIIM), influx management and PIMM related impacts. Stakeholders were informed that an in-migration management plan will be developed and implemented with the objective of reducing the number of people that come to the project-affected communities (PAC) 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. The camps would

be closed and 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 concerning the local content 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.

12.2.1.2 Physical Environment

Stakeholders raised concerns about potential impacts on water resources (access, increased demands and quality), 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, as well as the pollution prevention plan that will minimise impacts such as air and noise pollution.

12.2.1.3 Biodiversity

Stakeholders raised concerns about potential impacts on ecologically important habitats, particularly Swaga Swaga Game Reserve. They also emphasised the presence of protected species in the project area of influence (AOI). 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 that will be implemented to ensure biodiversity is not affected if the pipeline is to pass through protected areas. They were also informed about the biodiversity management plans which will contain such measures for terrestrial and marine environments.

12.2.1.4 Project and ESIA-Related Matters (Including Stakeholder Engagement)

Questions were asked about the pipeline routing 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 raised questions about a marine emergency response plan.

In response, stakeholders were informed about the selection process for the pipeline route, pipeline engineering design and water course crossings, and that the permanent right-of-way (RoW) required for the pipeline is 30 m. Stakeholders were advised that negotiations with regards to the location and final use of the camps between the government and project are ongoing. 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 aims 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 discussed in the section below.

12.2.2 Grievance Mechanism

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

The grievance mechanism 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 mechanism has been presented to stakeholders during each consultation phase and is managed by EACOP staff (Community Liaison Officer and grievance administrator).

12.2.3 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 life of the project. The project will also seek to build partnerships with non-governmental organisations, civil society organisations 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 RAP team will continue stakeholder engagement throughout the RAP process.

The grievance mechanism will continue to provide opportunities for stakeholders and project affected communities (PAC) to express grievances about project activities.

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

12.3 Impacts – Normal Operations

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

Project effects that were considered likely to result in adverse or beneficial impacts on biodiversity, the physical environment, the marine environment, socio-economic and health and cultural heritage during the construction and operation have been evaluated in the ESIA. This process was informed by professional, industry specific experience and the characteristics of the AOI. The pre-mitigation impacts are included in Appendices E2 and E3 of this volume and Appendix C1 of Volume 2, including the significance of the impacts. Management plans and mitigation measures are actions or systems that have been or will be used to enhance the benefits provided by the project or avoid, remove, reduce or compensate for negative impacts. Mitigation of potential impacts has been an integral part of the EACOP project design and ESIA process that will continue through detailed design, construction, operation and decommissioning.

The design and construction of pipelines has evolved over many years and a substantial body of good design, construction and operational practices that contribute to impact mitigation exist. Standard good practices are being implemented by the project, including for the:

- onshore pipeline, and permanent and construction facilities:
  - minimisation of the overall footprint
  - burying the entire pipeline along the route to reduce permanent habitat fragmentation, interference by third parties and security concerns
  - measures to reduce sediment release during watercourse crossings
  - measures to reduce sediment runoff to watercourses, such as silt fences
  - reinstatement of the RoW and construction facilities after completion of construction
  - waste reduction and waste segregation
  - soil-management measures to enhance natural revegetation after reinstatement including topsoil segregation and erosion control
  - maximising local employment
  - development and implementation of a resettlement policy framework
  - implementation of an archaeological watching brief during topsoil stripping and trench excavation to ensure damage to unknown archaeological sites is reduced
- load-out facility (LOF):
  - controls over the discharge of effluents from construction and operational vessels
  - soft-start procedures during pile installation
  - construction vessel management plan – including definition of anchoring areas.

Generic impacts could occur from several aspects and can be non-location and location-specific. The generic type impacts are mitigated mostly by standard good practice, as described above.

Location-specific impacts are often associated with activity that has the potential to affect VECs at a specific location. They usually require additional specific mitigation measures and additional monitoring, inspection and audit and communication with stakeholders to ensure that general mitigation measures are effective. The ESIA process has included identifying potential significant impacts, and technically and financially feasible and cost-effective means of mitigating location-specific impacts.

Where a potential impact has been identified, a hierarchy of options for mitigation has been considered, including:

- avoiding at source – remove the source of the impact
- abating at source – reduce the source of the impact
- attenuating – reduce the impact between the source and the VEC
- abating at VEC – reduce the impact at the VEC
- remedying – correct the impact after it has occurred
- compensating or offsetting – replace in kind or with a different resource of equal or better value.

The EACOP project will develop and implement a biodiversity action plan incorporating enhancement and conservation measures to meet this requirement.

The assessment of impacts and application of mitigation measures is an iterative process, which continues until an impact is deemed as not significant as reasonably practicable. Residual impacts are those that remain after the completion of this process.

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 GR and the Talamai OA
  - 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 inhabit the Kagera River, River Pangani, Lake Victoria Wetlands, Wembere Wetlands, Sigi River 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 the noise environment near the construction of pipeline and AGIs, and near the AGIs during operation
- marine environment:
  - destruction of coral during construction of marine facilities
  - change to marine acoustics during the construction and operation of marine facilities and the related impacts on marine flora and fauna
- socio-economic and health environment:

- competition over employment opportunities
- loss of grazing land
- loss of access to artisanal mining
- loss of, or restriction of access to, existing fishing grounds, transit routes, fish landing sites and market sites due to the Marine Exclusion Zone
- displacement of fishing effort (from loss of, or restriction of access to, grounds) into adjacent grounds
- 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 tangible and intangible cultural heritage.

The pre-mitigation significant impacts assessed, and associated management plans are summarised below in Table 12.3-1.

Table 12.3-1 Pre-mitigation Significant Impacts

Valued Environmental Component	Pre-mitigation Significant Impacts	Management Plans
Biodiversity		
Habitats of conservation importance	None[1]	
Flora and fauna species of conservation importance	*Generic*	
	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 species movement during construction of RoW	Biodiversity management plan
	Location Specific	
	Burigi–Biharamulo GR and KBA: 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

[1] Management plans and mitigation further reduced the predicted impacts

Table 12.3-1 Pre-mitigation Significant Impacts

Valued Environmental Component	Pre-mitigation Significant Impacts	Management Plans
	Itigi-like thicket: Loss of endemic and or range-restricted plant species	Biodiversity management plan
	MCPY12: Facilitated access leading to habitat loss	Biodiversity management plan
	Talamai OA and PRS1: 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 OA and Kitwai GCA (part of the Masai Steppe IBA): Loss of breeding and forage habitat to species of conservation importance	Biodiversity management plan Reinstatement plan
	MCPY13 and MCPY14: Loss of breeding and foraging habitat Disturbance	Biodiversity management plan Reinstatement plan Project induced in-migration management plan Pollution prevention plan
	PRS1: Facilitated access leading to habitat loss	Biodiversity management plan Labour management plan Community health, safety and security plan Stakeholder engagement plan
	Sigi River: Loss of high and very high sensitivity plant species	Biodiversity management plan Reinstatement plan
	MST: Loss of high and very high sensitivity plant species Habitat loss	Biodiversity management plan Reinstatement plan
Legally protected, internationally or nationally recognised onshore areas	*Location Specific* Burigi–Biharamulo GR and KBA: Loss of ecological function and integrity of protected site through impacts on species and habitats	Biodiversity management plan Reinstatement plan

Table 12.3-1 Pre-mitigation Significant Impacts

Valued Environmental Component	Pre-mitigation Significant Impacts	Management Plans
Physical Environment		
Soil	None	
Surface water	None	
Groundwater	None	
Landscape	None	
Air quality	PS3 and PS5: Increased NO_2 concentrations Increased PM_{10} and $PM_{2.5}$ concentrations	Pollution prevention plan
Acoustic	PS3 and PS5: Increase in baseline noise environment	Pollution prevention plan
	MST: Increase in baseline noise environment	
Socio-economic and Health Environment		
Local economy (non-land-based livelihoods)	*Location Specific* 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
Land-based livelihoods	*Generic* Permanent loss of land used for crop farming Permanent loss of access to artisanal mining sites *Location Specific* PACs near all MCPYs: Permanent loss of grazing land Zongomera and Kimana villages: Permanent loss of access to artisanal mining sites Mbogwe district (KP583.9 and 639.7), Kahama Township Authority, Geita district:	Pollution prevention plan Resettlement action plan Monitoring and reporting plan

Table 12.3-1 Pre-mitigation Significant Impacts

Valued Environmental Component	Pre-mitigation Significant Impacts	Management Plans
	Permanent loss of access to licensed mining concessions PACs near all pumping stations and MST: Permanent loss of grazing land	
River-, lake- and marine-based livelihoods	*Location Specific* 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, grounds) into adjacent grounds	Resettlement action plan (includes a marine livelihoods restoration plan) Stakeholder engagement plan Monitoring and reporting plan
Land and property	*Generic* 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	Occupational health, safety and security plan Community health, safety and security plan Labour management plan Pollution prevention plan Monitoring and reporting plan
	Location Specific	
	PACs near all MCPY and coating facility: Permanent loss of private land due to project land acquisition Land speculation by third parties New disputes and exacerbation of pre-existing disputes and conflict around land and property Permanent loss of physical structures due to project land acquisition	Resettlement action plan Stakeholder engagement plan Community health, safety and security plan Monitoring and reporting plan 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

Table 12.3-1 Pre-mitigation Significant Impacts

Valued Environmental Component	Pre-mitigation Significant Impacts	Management Plans
	Masusu: New disputes and exacerbation of pre-existing disputes and conflict around land and property	Resettlement action plan Stakeholder engagement plan Community health, safety and security plan Monitoring and reporting plan
	PACs 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	Resettlement action plan Stakeholder engagement plan Community health, safety and security plan Monitoring and reporting plan
Workers' health, safety and welfare	*Generic* Other occupational health and safety incidents causing diseases, injuries and mortality	Community health, safety and security plan Occupational health, safety and security plan Labour management plan Transport and road safety management plan
Social infrastructure and services	*Generic* Deterioration of road conditions	Infrastructure and utilities management plan
Community health	*Generic* An increase in the burden of disease along the project's transport corridors caused by drivers spreading communicable diseases	Community health, safety and security plan Occupational health, safety and security plan Pollution prevention plan Waste management plan Stakeholder engagement plan
	Location Specific	
	PACs near all MCPY: The transmission of communicable diseases Outbreaks of infectious diseases	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

Table 12.3-1 Pre-mitigation Significant Impacts

Valued Environmental Component	Pre-mitigation Significant Impacts	Management Plans
	The transmission of communicable diseases between the project's externally contracted workforce and PACs	Project-induced in-migration management plan Community health, safety and security plan Stakeholder engagement plan
	Reduction in the availability of potable water	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
	PACs near PS3, PS5 and MST: Increased risk of respiratory diseases due to project activities	Pollution prevention plan
Community safety, security and welfare	*Generic* Conflict between PACs and project security personnel *Location Specific* Mleni mtaa, Mabokweni mtaa, Helani hamlet, Putini mtaa and Chongoleani mtaa (KP1429–1442.5): Conflict between PACs and project security personnel	Community health, safety and security plan Stakeholder engagement plan
Tangible and intangible cultural heritage	*Generic* 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	Cultural heritage management plan

The following sections present the significant residual impacts remaining after mitigation, and the procedure for decommissioning. Beneficial project impacts are also described. All potentially significant ecosystem-services-related impacts are addressed by the VEC impact assessments and associated management plans.

12.3.1 Beneficial Impacts

Potential project impacts, predominantly relating to socio-economic VECs, will be beneficial. Where possible, enhancement measures detailed in Table 12.3-2 will be implemented to increase the benefits to local people, and the local and national economy.

Table 12.3-2 Beneficial Project Impacts

Beneficial Impacts	Phase Construction (C) Operation (O)	Enhancement Measure
Biodiversity		
Permanent change of land use on the RoW from crop land to grassland in agricultural areas, which will have a direct biodiversity benefit	O	None
Socio-economic and Health		
Contribution to the national economy from investment	C and O	None
Changes to the fiscal balance	C and O	None
Generation of national and local employment opportunities	C and O	The procurement and supply chain management plan, local content plan, labour management plan and the stakeholder engagement plan
Provision of training and skill development opportunities for local workers	C and O	The procurement and supply chain management plan and the labour management plan
Opportunities for national and local businesses through project procurement	C and O	The procurement and supply chain management plan, local content plan and the labour management plan
Improved road conditions due to Tanzania National Roads Agency (TANROAD) road widening and resurfacing, benefiting business owners and public transport, and improving ability to sell crops to nearby markets for farmers and traders	C and O	The infrastructure and utilities management plan, procurement and supply chain management plan, monitoring and reporting plan and the stakeholder engagement plan
Improvement in the health and safety of employees from disease awareness and reduction programmes	C and O	The occupational health, safety and security plan

Table 12.3-2 Beneficial Project Impacts

Beneficial Impacts	Phase Construction (C) Operation (O)	Enhancement Measure
Conversion of main camp pipe yard (MCPY) structures into community facilities, leading to improved service provision in PACs	C	None
Increased knowledge of tangible and intangible cultural heritage	C and O	The cultural heritage management plan
Employment of people to survey and investigate cultural heritage affected by the project	C and O	The cultural heritage management plan

12.3.2 Significant Residual Project Impacts

The impact assessment process included applying proposed mitigation to the potential project impacts identified for each VEC. Table 12.3-3 summarises the number of generic and location-specific impacts assessed and the mitigation measures for each VEC group. The significance of impacts was then re-assessed. The significant residual project impact after mitigation is presented in Table 12.3-4, and the reasons why it remains significant is described.

Table 12.3-3 Impacts Assessed and Mitigation Measures

	Generic Impacts	Generic Impact Mitigation Measures	Location-Specific Impacts	Location-Specific Impact Mitigation Measures
Biodiversity	33	53	63	32
Physical environment	26	40	338	41
Social	59	64	479	59

Table 12.3-4 Significant Residual Project Impacts

Significant Residual Impacts	Phase Construction (C) Operation (O)	Post-Mitigation Significance Rationale
Biodiversity – Flora and Fauna Species of Conservation Importance		
Loss of breeding and foraging habitat for International Union for Conservation of Nature (IUCN) critically endangered (CR) species (white-backed vulture), IUCN endangered (EN) species (steppe eagle and ashy red colobus monkey) and keystone species (raptors, owls, lion, leopard) in Burigi–Biharamulo Game Reserve (GR) and Key Biodiversity Area (KBA).	C and O	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 of very long duration (as forest will take a long time to return to their original condition) to a national extent affecting very high sensitivity species. A Biodiversity Action Plan incorporating enhancement and conservation measures will be developed and implemented.
Use of upgraded access road from pressure reduction station (PRS) 1 and MCPY13 and 14 into Talamai Open Area (OA) and Kitwai Game Controlled Area (GCA) by nonproject persons, facilitating access leading to habitat loss and disturbance to bird and mammal species in Talamai OA through increased deforestation, noise, lighting, hunting and human activity during construction and operation.	C and O	The construction of PRS1, its new road and the construction camps are still likely to cause PIIM of people who will cause significant impacts on species of conservation importance in the Talamai OA and Kitwai GCA. This residual impact is very long duration, as the road will be permanent, to a national extent and affecting species of very high sensitivity. A Biodiversity Action Plan incorporating enhancement and conservation measures will be developed and implemented.
Habitat loss during construction of pipeline and MST the East African Coastal Forest biodiversity hotspot for endemic and migratory species from site clearance.	C	Construction of the marine storage terminal (MST) site and the sterile zone will cause 73 ha of habitat loss, in an area which supports fauna and flora of conservation importance. This residual impact is considered of very long duration as the habitat loss will be permanent, of national extent and affecting species 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.

Table 12.3-4 Significant Residual Project Impacts

Significant Residual Impacts	Phase Construction (C) Operation (O)	Post-Mitigation Significance Rationale
Marine Environment – Fauna Species of Conservation Importance		
Sedimentation causing smothering of coral on Kwawa Reef with lethal and sublethal effects on coral and reef health.	C	As corals are highly sensitive, with species present intolerant to sedimentation, the impact remains significant. A monitoring program will be undertaken by the project that focuses on annual trends with respect to quality and health of coral reefs within the project AOI. The project will seek collaboration with the Marine Parks and Reserves Unit on common, beneficial objectives regarding coral reefs within the AOI.
Underwater noise from construction activities causing physical/physiological effects (mortality and potential injury, recoverable injury and temporary in hearing) in various fish species (including IUCN CR Napoleon wrasse), as well as mortality and potential injury to fish eggs and larvae.	C	The Napoleon wrasse is critically endangered (very high sensitivity). The impact will be of long duration and current project commitments will not mitigate the magnitude of the impact on this species. 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/physiological effects in the Napoleon wrasse, influencing fish community structure and populations (cited as an important nursery ground), a designated feature of the TCMP, which could affect the integrity of the protected area.	C	The role and abundance of Napoleon wrasse within the fish community structure of the TCMP is unknown, however, a change in the fish community structure and population is a significant effect to the integrity of the TCMP. Marine conservation measures developed to reduce the impact on Napoleon wrasse will also reduce the impact on the integrity of the protected area.

Climate

Construction phase direct and indirect emissions are minor relative to the operational emissions over the life of the project and have not been quantified. Direct operational emissions in Tanzania will range between 201–282 $ktCO_2e/a$ throughout the 25-year life, which represents around 0.2–0.3% of Tanzania's total GHG emissions in 2030. The contribution of EACOP to national emissions is therefore low and will not affect Tanzania's ability to meet its emission reduction targets published as part of the UNFCCC's Paris Agreement.

12.3.3 Transboundary Impacts

There are no significant residual transboundary impacts identified.

12.3.4 Cumulative Impacts

One potential cumulative impact remains significant after mitigation measures have been implemented.

The impact on high sensitivity fauna of conservation interest in the Talamai OA from the EACOP project access road to PRS1 and the national road upgrade between Handeni and Singida by TANROADS in the area of kilometre point (KP) 1143 and KP1223.5.

The national road is outside the Talamai OA boundary but the EACOP access roads to PRS1 and MC13 depart from this main road. The operation of the national road and the EACOP project access roads to MCPY13 and PRS1 cumulatively have the potential to cause increased pressure on natural resources in the OA from increased human access and activity. When MCPY13, which is located outside of the OA, is reinstated once construction is complete the effects of PIIM may be lessened as the draw from this area of habitation will be removed. However, as the access road to PRS1 is permanent and will provide access directly into the OA, impacts are still considered significant. When enhancement and conservation measures are developed and implemented, predicted cumulative impacts are expected to be reduced.

12.4 Impacts – Abnormal Operations and Unplanned Events

12.4.1 Overview

The project has adopted engineering design criteria with the intent to reduce the probability and consequences of unplanned events that could lead to impacts to social or environmental receptors. At each stage of the design process, a series of health, safety, and environment (HSE) studies have 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 HSE risk assessment methodology.

Risk assessment has been undertaken to inform:

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

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

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

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

The project will reduce risk through:

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

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

12.4.2 Unplanned Events – Pipeline and Marine Storage Terminal

During the construction phase, the 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 MCPYs 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 for any other reason, is the main significant risk. Oil spill modelling has been conducted for the pipeline and MST to consider the risks associated with oil loss during operation.

The oil that will be transported is considered heavy oil, characterised by a pour point of 31–40°C (the temperature at which a liquid becomes semi-solid and loses its flow characteristics) and a waxing temperature of 45–57°C (the temperature at which the oil first precipitates). The general chemical and physical properties of the heavy oil influences the potential migration and impact of a release, as it tends to

solidify when exposed to air or water which are at temperatures below those stated above.

A summary of the unplanned events with respect to the pipeline and MST, their potential impacts, and the key mitigation measures which will be in place to prevent or manage impacts is provided in Table 12.4-1.

Table 12.4-1 Summary of Unplanned Events – Pipeline and Marine Storage Terminal

Unplanned Event	Potential Impact	Management Plan(s)	Likelihood of Event (Low, Medium, High)
Construction			
Traffic accidents	Vehicle collision causing injury or mortality to member of public/workforce or livestock, or physical damage to community asset/structure or project asset	Transport and road safety management plan Emergency preparedness and response plan	Medium to High
Traffic accidents	Vehicle collision leading to spillage of transported fuel or chemical and causing contamination of soil and/or water, toxicity affecting living organisms		Medium to High
Fire	Impact to environmental and social VECs including biodiversity, community safety, security and welfare and land and property (e.g., 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 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 MCPYs and construction sites	Diesel release causing contamination of soil and or water, toxicity affecting living organisms	Pollution prevention plan Water management plan Emergency preparedness and response plan	Low (MCPYs) Medium (construction sites)

Table 12.4-1 Summary of Unplanned Events – Pipeline and Marine Storage Terminal

Unplanned Event	Potential Impact	Management Plan(s)	Likelihood of Event (Low, Medium, High)
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
Operation			
Traffic accidents	Vehicle collision causing injury or mortality to member of public, workforce or livestock, or physical damage to community asset, 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, water, toxicity affecting living organisms	Emergency preparedness and response plan	Low
Fire	Impact to environmental and social VECs including biodiversity, community safety, security and welfare and land and property (e.g., sensitive habitats, local community assets and the health of local community residents)	Emergency preparedness and response plan	Low
Geophysical hazards	Rupture of pipeline, 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 AGIs	Impact to surface water via migration of oil components dissolved in groundwater.	Emergency preparedness and response plan	Low
Modelled oil spill from pipeline or AGIs	Impacts to groundwater via migration of oil components dissolved in groundwater.	Emergency preparedness and response plan	Low
Modelled oil spill from pipeline or AGIs	Impacts to soil from NAPL in the unsaturated zone.	Emergency preparedness and response plan	Low

Table 12.4-1 Summary of Unplanned Events – Pipeline and Marine Storage Terminal

Unplanned Event	Potential Impact	Management Plan(s)	Likelihood of Event (Low, Medium, High)
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 MST	Impact to underlying soil and groundwater environment	Emergency preparedness and response plan	Low

12.4.3 Unplanned Events at the Load-Out Facility

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 LOF
  - 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 (e.g., sabotage)
  - modelling of oil spills at sensitive locations.

If an unplanned event does occur during the project's lifetime, including the construction phase, EACOP'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 12.4-2.

Table 12.4-2 Summary of Unplanned Events – Load-Out Facility

Unplanned Event	Potential Impact	Key Management Plans	Risk
Construction			
Vessel collision with other vessels	Collisions between construction vessels and fishing vessels, construction vessels and commercial vessels, and between construction vessels causing fire or sinking of 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 vessels and fishing vessels) Medium (between construction vessels and commercial vessels, and between construction vessels)
Vessel collision with the LOF while under construction	Collisions between construction vessels, fishing vessels or commercial vessels and the LOF potentially causing loss of life, or spill of bunker oil with consequences for local community livelihoods, habitats and species	Marine stakeholder engagement plan, marine community health safety and security plan; marine vessel management; marine pollution prevention plan; marine emergency preparedness and response plan	Low (between construction vessels and LOF) Medium (fishing or commercial vessels and LOF)
Vessel collision with megafauna	Collisions between construction vessels and megafauna (turtles and marine mammals) causing injuries or fatalities to megafauna	Biodiversity management plan	Low
Vessel collision with divers/snorkelers	Collisions between construction vessels and divers/snorkelers causing injuries or fatalities to divers/snorkelers	Marine stakeholder engagement plan, marine community health safety and security plan, marine vessel management plan	Medium

Table 12.4-2 Summary of Unplanned Events – Load-Out Facility

Unplanned Event	Potential Impact	Key Management Plans	Risk
Operation			
Vessel collision with other vessels	Collisions between tankers, tugs and fishing or commercial vessels, causing fire or sinking of vessel potentially resulting in loss of life, disturbance of the seabed and contamination	Marine stakeholder engagement plan, marine community health safety and security plan; marine emergency preparedness and response plan	Low
Vessel collision with megafauna	Collisions between tankers, tugs and megafauna (turtles and marine mammals) causing injuries or fatalities to megafauna	Marine stakeholder engagement plan, marine community health safety and security plan; marine emergency preparedness and response plan	Low
Vessel collision with the LOF	Collision of tankers with LOF causing an oil spill with consequences for local community livelihoods, habitats and species	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 species	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 species	Marine pollution prevention plan; marine emergency preparedness and response plan; terrestrial emergency preparedness and response plan; terrestrial pollution prevention plan	Medium

12.5 Decommissioning

The project components (i.e. pipeline, pumping stations (PS), PRSs, the MST and the LOF) 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 associated impacts of decommissioning (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 is returned to the Government. The decommissioning plan will include specific consideration of unplanned events which may occur during decommissioning consistent with EACOP project requirements.

12.6 Environmental and Social Management and Monitoring Plans

In accordance with the Tanzania Environmental Impact Assessment and Audit Regulations, 2005, an environmental and social management plan (ESMP) and an environmental and social monitoring plan (ESMoP) have been developed.

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

The ESMoP includes 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.

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

A separate suite of management plans will be drafted for:

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

The following is a list of the management plans that will be developed prior to the commencement of construction and operation activities. A separate suite of management plans will be developed for terrestrial and marine. Terrestrial management plans include:

- 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.

Marine management plans include:

- biodiversity management plan
- pollution prevention plan
- waste management plan
- natural resource management plan
- cultural heritage management plan
- reinstatement plan
- stakeholder engagement plan
- resettlement action 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.

Changes to the project may occur after preparation and submission of the ESIA. A management-of-change procedure will be implemented, which includes:

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

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

12.7 Cost Benefit Analysis

The cost benefit analysis was developed before finalisation of the Host Government Agreement between the Government of Tanzania and the project. The Host Government Agreement is needed to inform the final investment decision. A positive final investment decision will be taken only if the project will provide a positive return on investment and if it has a positive economic benefit to all stakeholders.

The costs and benefits of the EACOP project, for the most part, are synonymous with the impacts (negative and positive). The costs and benefits considered include:

- costs
  - project investment
  - environment
  - socio-economic
  - benefits
  - income
  - environment
  - socio-economic.

As it is challenging to monetise financial costs associated with some environmental loss or disturbance and costs to communities, the costs considered are those associated with mitigating and monitoring impacts. The costs are based on current engineering and design, and are subject to adjustment.

The main costs include:

- estimated capital investment in Tanzania of USD 3 billion (TZS 6.8 trillion)
- RAP implementation in excess of USD 100 million (subject to final approval of the valuation reports and signing of the agreements with project affected people)
- annual operation of approximately USD 90 million (TZS 205.4 billion)
- environmental mitigation through design and engineering for an estimated USD 32 million (TZS 72.7 billion), other environmental management and mitigation measures for an estimated USD 1.9 million per year (TZS 4.3 billion), and environmental monitoring for an estimated USD 3.8 million (TZS 8.6 billion)
- approximately 9,500 project affected people, some of whom will lose land to the project; others will lose other types of assets (mainly crops, economic trees and structures); and some will be physically displaced (i.e., will lose residential structures)
- management and mitigation of community impacts for an estimated USD 8.6 million (TZS 19.5 billion)
- those associated with government project-related responsibilities which are currently not quantifiable.

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.

The main benefits include:

- transportation of petroleum products via a pipeline carrying much less environmental risk than transportation by trucks or rail
- contribution to the economy (income) of USD 3 billion (TZS 6.9 trillion) over the three-year construction period
- provision of business opportunities for different sectors of the economy and enhancing the capacities of local companies
- provision of direct, indirect or induced jobs (21,000 during construction and 2,255 during operation), and knowledge transfer and skills development opportunities
- operation contribution per year of USD 90 million direct and USD 150 million indirect and induced (TZS 548 billion).

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.

12.8 Recommendations

This 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 VECs in the project AOI. The recommended measures, consolidated in the ESMP, which are either incorporated into project design, or actioned during project implementation, are intended to mitigate the impacts and their significance.

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

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

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