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2 PROJECT DESCRIPTION

2.1 OVERALL EACOP PROJECT DESCRIPTION

The Project entails the construction and operation of a 24-inch diameter insulated, electrically trace heated, buried pipeline to transport crude oil from the inlet flange at Kabaale Pumping Station (PS-1) in the Hoima District of Uganda (in the area of the Lake Albert Development) to an export facility at an MST in the Tanga Region of Tanzania. The proposed pipeline route alignment through Uganda is reflected in Figure 1-1.

The pipeline will be buried at an average depth of between 1.8 m and 2 m, the length is approximately 1,443 km, of which approximately 296 km is in Uganda.

The design flow rate of the pipeline will make it capable of transporting 216,000 barrels of crude oil per day (216 Kbpd). A key element of the design is temperature management to maintain the crude oil above pour point and as much as possible above wax appearance temperature (WAT). The project components responsible for this task are:

- Electrical heat tracing (EHT);
- Pumping station bulk heaters (later in Project life); and
- MST bulk heaters.

The pipeline will be buried, thermally insulated with polyurethane foam (PUF) and EHT will be installed for the entire length of the pipeline. EHT is a heating system used to raise and / or maintain the temperature of the pipe by an electrical heating element that runs in physical contact along the length of the pipeline. During pipeline commissioning, the EHT will heat the crude oil to keep it above 50°C. At plateau production, pipeline insulation will maintain crude temperature above 50°C without any additional heat supply.

During the operational phase, the EHT will provide heating during periods of reduced flow rates, shutdowns or when maintenance is required. This EHT system will require electrical power, which will be in the form of an underground cable that will be installed parallel to the pipeline trench. The power required for the EHT will be acquired from generators at the pumping stations and converted to the required voltage via step-down sub-stations located along the pipeline route.

2.2 UGANDA EACOP PROJECT COMPONENTS

In Uganda, the EACOP project comprises the following components:

- **Construction Facilities:**
  - four main camps and pipe yards (MCPY-01 through to MCPY-04); and
  - new and upgraded construction facility access roads.
- **Operational Facilities:**
  - 296 km of insulated, electrical heat-traced, buried 24-in. pipeline.
  - Above-Ground Installations (AGIs):
    - two pumping stations (PS-1 and PS-2); and
    - main line block valve stations and electric heat trace substations.
  - new and upgraded permanent access roads.

The construction and operational facilities are described further below.

2.2.1 Priority Area (PA) Facilities for Construction

Early Works (EW) facilities (Project components) must be established before construction activities can proceed. These are collectively referred to as PAs and include the following components in Uganda:

- Four (4) Main Camp and Pipe Yards (MCPY-01 through to MCPY-04); and
- construction access roads.

This RAP covers the land acquisition for all these construction facilities.

Main Camp & Pipe Yards (MCPYs)

The camps have been designed to accommodate 800–1000 people. Among the criteria for identifying camp locations was the requirement to minimise the daily commute from the camp to the work site. Depending on where the work will be conducted, it may be possible for local workers to commute from their homes.

A footprint of approximately 350 × 500 m (i.e. 17.5 ha) will be required for each MCPY with some variation. Construction access roads are also required along with upgrades to existing roads for MCPY-03 and MCPY-04. The camp section of an MCPY will be approximately 350 × 220 m and the pipe yard 350 × 280 m.

The locations selected for each camp was based on criteria (see Section 2.7) including being sited within approximately 50 km of the most remote work site, minimizing the land required and distance from existing road networks, and avoiding populated and protected areas. All MCPYs are located on agricultural land with minimal residential properties affected.

Four MCPYs will be established along the corridor in Uganda (see Figure 2-1) to accommodate workers and store line pipe before distribution along the pipeline corridor:

- MCPY-01: Kakumiro District (Kilometre Point (KP 39.3);
- MCPY-02: Mubende District (KP 124.6);
- MCPY-03: Sembabule District (KP 191.2); and
- MCPY-04: Kyotera District (KP 282).

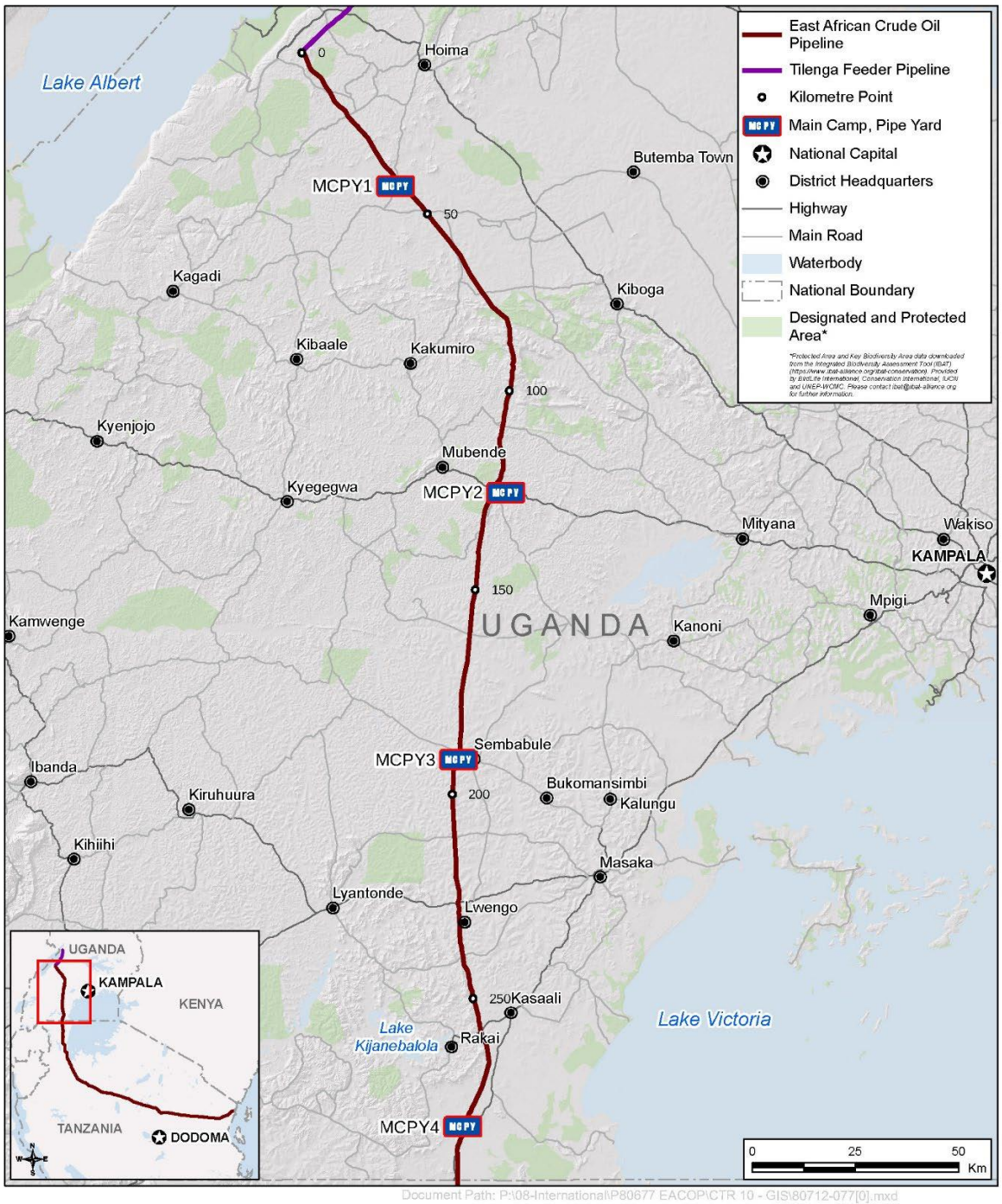

Figure 2-1 Location of Main Camp & Pipe Yards

A typical layout of a MCPY is shown in Figure 2-2 . The camps will contain the following facilities:

- pipe storage yard;
- accommodation and sanitary facilities;
- recreation facilities;
- kitchen and canteen;
- offices;

- workshops;
- first aid post;
- water supply and treatment;
- sewage treatment system;
- waste storage and processing;
- power generators;
- fuel storage; and
- an emergency evacuation area.

Mobile cabins (or units of a similar temporary nature) are proposed to be used on the MCPY sites. These will generally be removed after construction, including (but not limited to) the accommodation units, offices, kitchen, canteen, and recreational facilities.

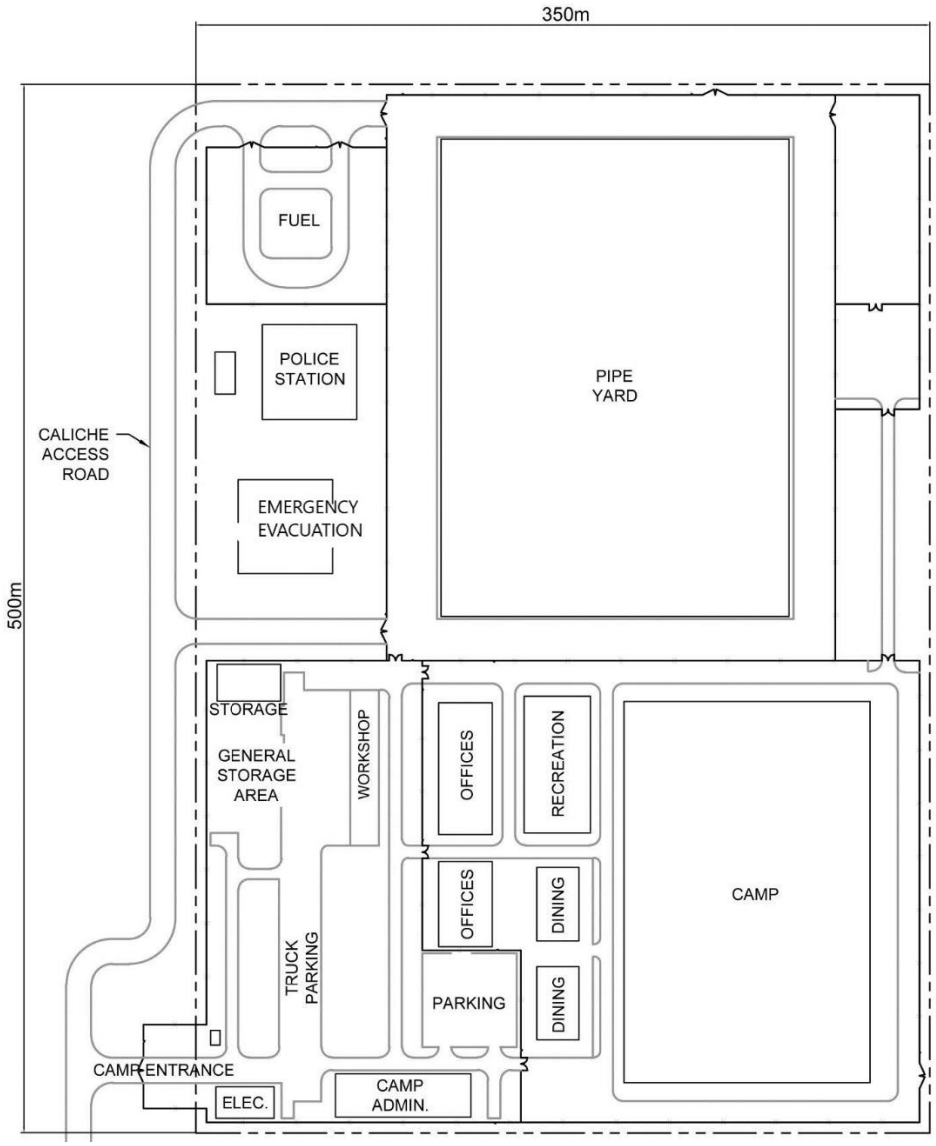

Figure 2-2 Typical Main Camp & Pipe Yard (MCPY) Layout

Construction Access Roads

There are short access driveways for facilities integrated within the MCPY layout (see Figure 2-2). The site selection process for the MCPYs aimed to optimize the use of existing roads that could be upgraded to meet Project requirements whilst taking into consideration affected communities. For two of the MCPYs, MCPY-03 and MCPY-04, there is also the need to upgrade existing roads to enter the sites. The length of the new access road and upgraded existing roads for access to the MCPYs is summarized in Table 2-1.

Table 2-1 MCPY Access Arrangements

Facility	Access Driveways integrated into MCPY Footprint (m)	Existing Road Upgrade (m)
MCPY-01	558 m	-
MCPY-02	560 m	-
MCPY-03	738 m	1,700 m
MCPY-04	535 m	2,076 m

Acquisition of land is required for the new access roads and existing road upgrades for all the MCPYs. Additional land along the existing roads to be upgraded for MCPY-03, and MCPY-04 will also be required. A 30m wide construction road reserve width including the existing road is likely to be required for these two upgraded roads and this has been surveyed. The construction access roads will be 5 m wide or as agreed with the local authorities. All access roads to construction facilities will have an improved murram (laterite) surface.

2.2.2 Operational Facilities

Export Pipeline:

- A 296 km export buried pipeline is required from PS-1 in Hoima District to Kyotera District where the pipeline will cross into Tanzania.
- Pipeline construction corridor: A 30 m wide corridor will be utilized during construction. The corridor might be wider in certain areas, referred to as Additional Temporary Work Space (ATWS), depending on the local environment and construction requirements (such as stream / river crossings, road and other infrastructure crossings for example). The corridor will be rehabilitated appropriately once construction is complete.
- Export pipeline: Following construction, a permanent 10 m wide corridor is required for the safe operation and maintenance of the pipeline set within the 30 m construction corridor. During operation, the 30 m corridor will be kept clear from deep rooting vegetation and permanent structures to ensure the safe operation of, and easy access to, the pipeline for maintenance purposes. However, the operation of the pipeline will not present a barrier to people and livestock and the pipeline will not be fenced. Once the pipeline is buried, markers planted at regular intervals will be visible along the corridor.

Hydro test water storage facilities:

- These facilities are used to perform hydrostatic testing on the pipeline prior to commissioning to confirm the threshold measurement for the safe operation of the pipeline.

Above-Ground Installations (AGIs):

- Sub-stations:
  - The EHT system will require electrical power, in the form of an underground cable that will be installed parallel to the pipeline trench.
  - The power required for the EHT will be acquired from seven electric sub-stations: two within the pump station footprints, 4 combined with the MLBV stations and one located along the corridor.
  - The sub-stations will be located within the 30 m pipeline corridor width.
- Main Line Block Valves (MLBVs):
  - MLBVs are required primarily to isolate a section of the pipeline in the event of a rupture (which is very unlikely, and the pipeline design includes a leak detection system (fibre optic cable) for the entire pipeline).
  - MLBVs will be located at major crossing points and at each of the pumping stations: Fifteen (15) MLBVs within the pipeline corridor, four of which are combined with the electrical sub-stations.
  - The MLBVs will be located within the 30 m pipeline corridor width.
- Pumping stations (PS):
  - Two (2) pumping stations in Uganda are located at strategic intervals along the pipeline. These are used to monitor the flow in the pipeline and to boost the pipeline's internal pressure and flow (if required) to ensure safe operating limits. The location of the two pump stations are indicated in Figure 2-3.
  - The function of the pump stations are to provide pressurization for the transport of crude oil through the pipeline and crude oil temperature management.
  - PS-1 is located at the start of the pipeline (at KP-0) in Kabaale Industrial Park in Hoima District. The footprint for PS-1 is approximately 310 x 369 m, approximately 11.5 ha / 28.4 acres). Additional land take will be required at pump stations for the construction phase, emergency evacuation area and security facilities.
  - PS-2 is located at in Sembabule District KP 184+650. The main footprint for PS-2 is approximately 360 x 310 m. Additional land take will be required at pump stations for the construction phase, emergency evacuation area and security facilities.
  - The intention is for power for PS-1 and PS-2 to be provided by the Tilenga Upstream project Central Processing Facility (CPF).
  - For the construction phase an additional area will be required at the pump stations as temporary workspace to accommodate a storage area, workshops and a construction workforce camp.

Permanent New / Upgrades Existing Roads:

  - A new access road of 5,625 m will be required to PS-1 located within Kabaale Industrial Park. Upgrade of 1,100 m to an existing road to PS-2 in Sembabule District will be required.
  - All roads will be surveyed, designed, constructed, repaired and maintained to

Uganda National Roads Authority (UNRA) standards, with the cooperation of UNRA. Permanent access roads will be 8 m wide and a 30 m wide road reserve width will be required for the new and upgraded road. All access roads to permanent facilities will have sealed tarmac surface.

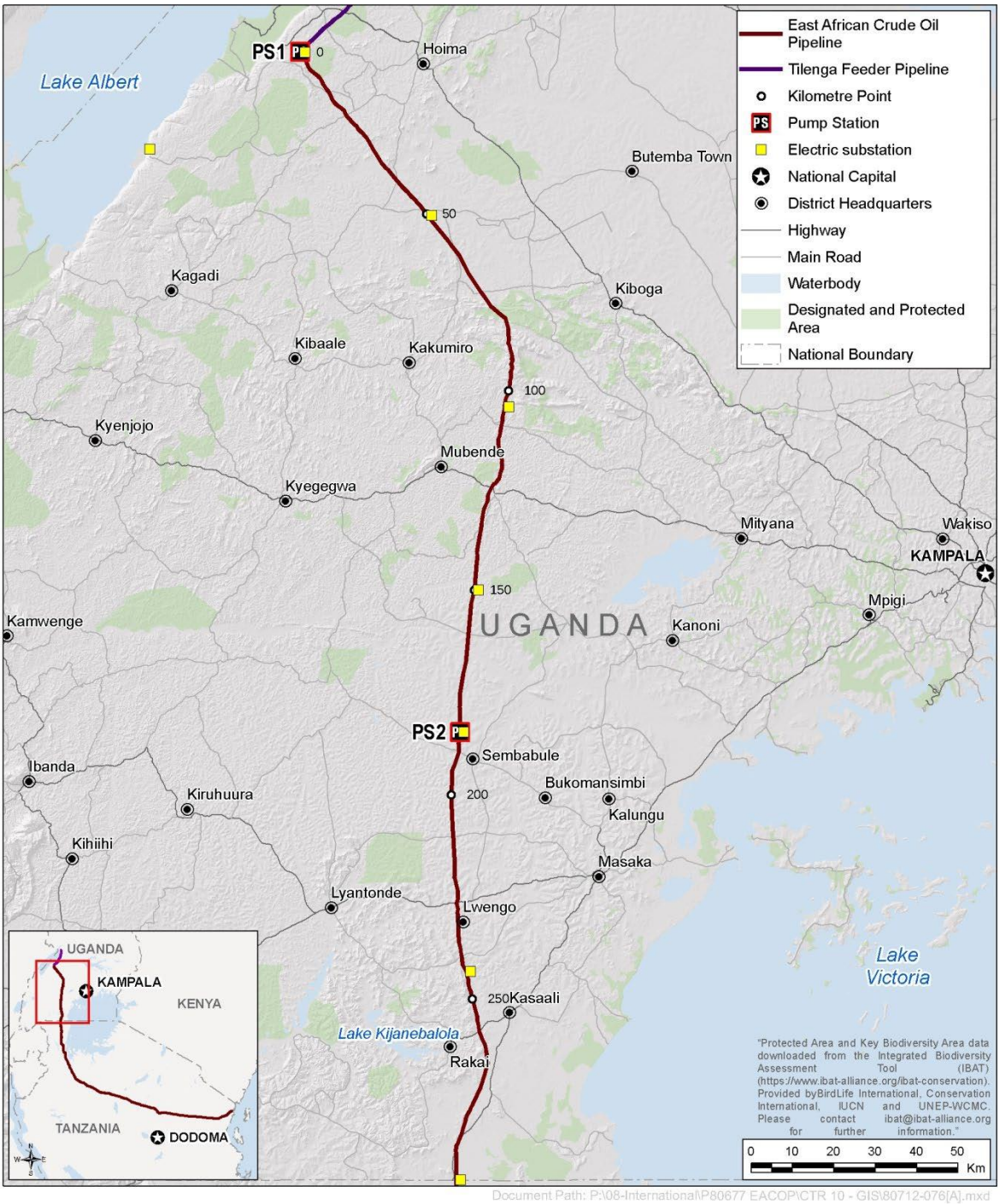

Figure 2-3 Location of Pump Stations

This RAP covers the land acquisition for all the operational facilities for the Project described above except for:

- Pump Station 1 (PS-1) and the first 1.5 km of the pipeline corridor which are within the

Kabaale Industrial Park.

- Hydro-test water storage facilities, as the land required is still to be confirmed. The principles of land acquisition contained within this RAP though will be applied to land required for these facilities.

2.2.3 Access and Management of Project Land

The GoU will acquire all land required for the Project on a permanent basis, even for the 30 m construction corridor for the pipeline. The land will be provided for use to the Project then under an arrangement set out in the HGA, which will comply with the principles set out in the IGA.

For the PAs, the Project will require this land for a short-term duration sufficient to support the construction, pipeline commissioning and construction facilities' decommissioning. After construction and decommissioning of the construction facilities the land for the PAs (i.e. MCPY-01 through to MCPY-04) will revert back to the State/relevant State Authority. For the land for the permanent operational facilities, the Project will require this land for a longer-term duration sufficient for the operation of the pipeline. After the end of the operation pipeline, the land will be returned to the State/relevant State Authority.

Access restrictions to Project land during construction and operation will be determined on the basis of health, safety and security considerations. The PA MCPYs will be fenced and access to these facilities will be strictly controlled. The AGIs (including PS-1 and PS-2) will be fenced and access strictly controlled by the Project.

The pipeline corridor will be unfenced, except where health and safety considerations require access restrictions. Existing vehicle crossings will be maintained. Where certain restrictions are unavoidable (e.g. short-term during construction in specific areas), provisions will be made for crossings of the pipeline route by people, vehicles and livestock near the restricted zone.

During the construction phase, construction activity will mostly be kept within the 30 m pipeline corridor, except for areas where additional temporary workspace is required, such as at existing infrastructure crossings. During operations, the corridor for the pipeline will be retained as 30 m. The Project will always require access to the pipeline corridor during operation for inspection, maintenance and repair.

No development of structures, planting of deep-rooted trees/vegetation or agricultural activities (e.g. crop production) will be allowed within the 30 m wide pipeline corridor except for grazing of wildlife and livestock crossing the corridor.

Where the 30 m wide corridor transects areas previously categorized as a protected and / or designated area, including, the Central Forest Reserve, the Project will be allowed to restore the land cover and manage the land use to achieve equivalent biological capacity. No development of structures or agricultural activities (e.g. crop production) will be allowed in these areas and the protected area management principles will be enforced and complied with. In these stretches deep-rooted trees will not be planted on the 10 m wide strip above the pipeline.

Additional land is required for the AGIs that will also remain operational over the lifespan of the Project, after which, these facilities will be decommissioned.

2.3 LOCATION & SETTING OF PROJECT

The section of pipeline through Uganda will be 296 km traversing the 10 Districts of Hoima, Kikuube, Kakumiro, Kyankwanzi, Mubende, Gomba, Sembabule, Lwengo, Rakai and Kyotera. The pipeline traverses 10 districts, 27 sub-counties, 3 town councils and an estimated 171 villages, as indicated in the table below. The pipeline for the last 52 km runs into Kyotera District then into Rakai District, running back into Kyotera District then again into Rakai District before returning to Kyotera District up to the border with Tanzania:

Table 2-2 Affected Communities[1]

No.	District	Nearest KP Point		Length of Pipeline (km)	Sub-County / Town Council	No. of Villages
		Start KM	End KM			
-1	Hoima	0+000	1+497	1.497	(Kabaale Industrial Park inc. PS-1)	-
		1+497	5+545	4.048	(1) Buseruka	1
2	Kikuube	5+545	35+980	30.435	(2) Kiziranfumbi, Buhimba	20
3	Kakumiro	35+980	69+399	33.419	(4) Katikara, Mpasaana Sub-county, Nkooko Sub-counties and, Kisiita Town Council,	25
4	Kyankwanzi	69+399	84+113	14.714	(1) Gayaza	8
5	Mubende	84+113	146+670	62.557	(4) Butoloogo, Kiruma, Madadu, Kitenga	26
	River Nabakazi	146+670	147+900	1.230	-	-
6	Gomba	147+900	164+600	16.700	(1) Maddu	3
	River Katonga	164+600	164+900	0.300	-	-
7	Sembabule (inc. PS-2)	164+900	217+375	52.475	(8) Lugusulu, Mitima, Kawanda, Mijwala, Lwebitakuli, Katwe and Nakasenyi Sub-counties and Sembabule Town Council	32

[1] Includes communities affected by MCPY-01 to MCPY-04, PS-2 and construction and permanent new and upgraded access roads. Does not include communities affected by facilities contained within Kabaale Industrial Park for which the land has already been acquired.

No.	District	Nearest KP Point		Length of Pipeline (km)	Sub-County / Town Council	No. of Villages
		Start KM	End KM			
	Lwebicuncu Stream	217+375	217+457	0.082		
8	Lwengo	217+457	243+670	26.213	(3) Lwengo and Ndagwe Sub-counties and Lwengo Town Council	19
10	Kyotera	243+670	250+900	7.230	(2) Nabigasa and Kasaali	5
9	Rakai	250+900	264+900	14.000	(1) Lwanda	15
10	Kyotera	264+900	268+155	3.255	(1) Kasasa	3
9	Rakai	268+155	274+105	5.950	(1) Kifamba	2
10	Kyotera	274+105	295+886	21.781	(1) Kakuuto	12
Total				**296 km**	**27 Sub-counties & 3 Town Councils**	**171**

Moving along the route:

- The export pipeline originates at the PS-1 located at the planned Kabaale Industrial Park, in Hoima District. Initially, it crosses relatively low terrain with undulating topography characterised by widespread cropland, settlement and transport infrastructure between Hoima and Mubende districts.
- The corridor traverses through a modified section of Taala Central Forest Reserve (CFR) in Kyankwanzi District, and crosses near the eastern border of Kasana-Kasambya Forest Reserve in Mubende District, but does not enter this reserve. The pipeline corridor crosses Taala CFR between chainages KP 78+033 to KP 82+122.
- There are watercourse crossings including the Kafu River between Hoima and Kakumiro Districts, Nabakazi River between Mubende and Gomba Districts, Katonga River between Gomba and Sembabule Districts, and Kibale and Jemakunya Rivers in Kyotera District.
- The pipeline corridor traverses gently undulating grass and farmland, hills with open plateaus, open grassland, wetlands in Gomba and Sembabule Districts and a relatively flat land scape as it runs towards Mutukula in Kyotera District near the border with Tanzania. The corridor avoids the large local settlement of Mutukula at the border as it progresses into Tanzania.
- On the approach to the Tanzania border, and the north-western corner of Lake Victoria, the corridor crosses a substantial zone of wetlands in a high average rainfall zone that is also characterized by almost unbroken crop land, a substantial proportion of which is under rice cultivation, cattle grazing land and settlement.

The main livelihood activity of the Project-affected communities is subsistence agriculture. Most settlements are concentrated along national and secondary roads. Villages often have a

central trading place in which main business and social activities take place. Some districts along the pipeline are experiencing pockets of urbanization having become attractive to rural migrants due to employment and business opportunities and relatively better infrastructure, including Hoima municipality and the urban centres Mbirizi and Kinono in Lwengo District.

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

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

Other livelihood activities within the wider Project-affected districts include:

- In Hoima District, fishing mainly from Lake Albert, mining of gold along Kafu River basin, hematite, kaolin and clays mainly used for bricks and pottery.
- In Kakumiro, because of the relatively dry climate, cattle ranching for beef and dairy farming are favourable activities. Fish farming is being implemented increasingly in the district as well.
- In Kyankwanzi, logging/charcoal-making is one of the key major economic activities practised in the district along with crop husbandry and livestock keeping.
- In Sembabule, other livelihood activities include tourism e.g. forest reserves with animals like monkey, sitatunga, cob, bushbuck, reedbuck, waterbuck and various other antelope, leopard, wild pig, baboon, hyena, buffalo and squirrels, amongst others.
- In Lwengo the means of earning a livelihood include livestock husbandry along with the fishing trade and tree felling and pit sawing. Fish farming in Kyotera district is being implemented increasingly as well.
- Milk production and some processing is a key activity in Sembabule and Gomba districts

2.4 PROJECT LAND REQUIREMENTS

The Project will require access to over 2,740 acres (1,109 ha) of land in Uganda. Most of this (over 90%) comprises the construction corridor for the export pipeline corridor. The Project land requirements are summarized in Table 2-3. The affected land area includes that within Kabaale Industrial Park required by the Project and also some infrastructure crossings which will not be acquired.

Table 2-3 Summary of Project Land Requirements

Facility	District Location / Pipeline Section	Nearest KP Point		Length of Pipeline (km)	Land Take Area[2]	
		Start KP	End KP		Acres	Hectares[3] (ha)
Construction Facilities (include new & upgraded construction access roads):						
MCPY-01	Kakumiro	39+300		-	47.22	19.11
MCPY-02	Mubende	124+600		-	46.82	18.95
MCPY-03 and its Access road	Sembabule	191+200		-	60.82	24.61
MCPY-04 and its Access road	Kyotera	282+000		-	61.59	24.93
Sub-Total Construction Facilities :					216.5	87.60
Operational Facilities :						
Pipeline Corridor & PS-1 site within Kabaale Industrial Park [4]	Hoima	0+000	1+497	1.497	40.40	16.35
Pipeline Corridor & AGIs (including PS-2 and access road) outside Kabaale Industrial Park	Hoima	1+497	5+545	4.048	34.04	13.77
	Kikuube	5+545	35+980	30.435	251.78	101.89
	Kakumiro	35+980	69+399	33.419	264.26	106.95
	Kyankwanzi	69+399	84+113	14.714	120.14	48.62
	Mubende	84+113	146+670	62.557	551.84	223.33
	(inc. River Nabakazi)	146+670	147+900	1.230	13.43	5.43
	Gomba	147+900	164+600	16.700	135.67	54.90
	(inc. River Katonga)	164+600	164+900	0.300	3.51	1.42
	Sembabule	164+900	217+375	52.475	472.03	191.03

[2]The land takes are gross land takes that include Government land like Central Forest Reserve, wetlands, streams, national and district roads, railway etc. This does not compare with land in valuation report, because what is indicated in the valuation report includes mostly land to be compensated.

[3] 1 Hectare (ha) = 2.471 acres

[4] Additional land take will be required for temporary works area and access road. About 23.03m (0.171 acres) of pipeline is shared between PS1 and pipeline corridor KP (0+000 to 0+023)

Facility	District Location / Pipeline Section	Nearest KP Point		Length of Pipeline (km)	Land Take Area[2]	
		Start KP	End KP		Acres	Hectares[3] (ha)
	(including PS-2) Lwebicuncu Stream	217+375	217+457	0.082	1.11	0.45
	Lwengo	217+457	243+670	26.213	215.95	87.39
	Rakai	250+900	264+900	19.950	163.48	66.16
		268+155	274+105			
	Kyotera	243+670	250+900	32.266	255.75	103.50
		264+900	268+155			
		274+105	295+886			
Sub-Total Operational Facilities :					2,523	1,021
Total Construction & Operational Facilities :					2,740	1,109

The area of the land take indicated in the table above is the total Project footprint that will be required for the development of EACOP. It differs from the area in the valuation reports because of the following reasons:

- The land which belongs to GoU is not included in the valuation reports such as,
  - Taala Central Forest Reserve; and
  - Wetlands captured as Nema and River crossings; and
  - Public infrastructure and utilities reserves.
- Land for PAPs where harmonization with UNRA is not yet completed.
- Land for Absentee landlords.
- Land for PAPs whose land title boundaries were not rectified because they did not sign the consent to correct their land titles.

Any additional permanent land acquisition required for the Project would be undertaken in accordance with the principles outlined in this RAP (including the entitlements framework). If necessary Addendums to this RAP covering any such changes would focus on the additional / altered displacement impacts, outline of process for the additional land acquisition including the engagement, and if additional Project affected communities are affected some targeted socio-economic baseline.

2.5 Summary of Land Context

The legal framework in Uganda establishes and recognizes four (4) land tenure systems: Customary, Freehold, Mailo and Leasehold. The legal framework also recognises interests

inherent in land these include lawful and bonafide occupants. Therefore, land in Uganda can be 'physically encumbered' with overlapping interests in land held by various individuals or entities, and can also have other land users such as licensees. In addition, there are other legal encumbrances such as mortgages and caveats. The land tenure, interests and rights context in Uganda and the Project-affected districts is presented further in Chapters 3 and 5.

The type of land tenure through which the pipeline traverses and the multiple interests in the affected land is very important for the resettlement planning and compensation process. The pipeline traverses land under the four tenure systems (customary, mailo, freehold and leasehold as well as some land where the tenure is unknown) and some Public Land.

A summary of the tenure and interests held in the affected land in these Districts varies as the pipeline corridor runs from north to south, as summarised in the table below. There are also other land users, mainly licensees, present on some landowners parcels with varying status.

Table 2-4 Summary of Land Tenure System & Interest in Project-Affected Land along the Pipeline Corridor

No.	District	Length of Pipeline (km)	Tenure of Project-Affected Land[5]	Types Landowner Interests Held in Project-Affected Land[6]
1	Hoima[7]	4.048	Customary (predominant) and Freehold	Customary, Freehold and Lawful Occupant
2	Kikuube	30.435	Customary (predominant) and Freehold	Customary, Freehold (and Deed plans)
3	Kakumiro	33.419	Customary (predominant), Private Mail, Freehold and Public Land	Customary, Freehold, Private Mailo, Kibanja, Lawful Occupants and Public land (Wetland & River)
4	Kyankwanzi	14.714	Private Mailo (predominant), Central Forest Reserve and Public Land	Private Mailo , Bonafide Occupant, Kibanja and Public Land inc. Central Forest Reserve
5	Mubende	63.787	Private Mailo (predominant), Freehold, Leasehold and Public Land	Private Mail, Freehold, Leasehold, Kibanja, Lawful Occupant and Public Land
6	Gomba	17.000	Private Mailo (predominant), Leasehold (predominant), Unknown and Public Land	Private Mailo, Leasehold, Kibanja, Bonafide Occupant, Unknown and Public Land
7	Sembabule	52.557	Private Mailo, Freehold (predominant), Leasehold (predominant), Unknown	Private Mailo, Freehold, Leasehold, Kibanja, Lawful Occupants, Bonafide Occupants, Unknown and Public Land

[5] Freehold includes those at Deed Plan Level/Freehold Offer stage.

[6] Landowners include all those with an interest in the land i.e. Mailo interest, freehold interest, leasehold interests, public land, kibanja bonafide and lawful occupants.

[7] Not including the first 1.497 km of the pipeline which is within Kabaala Industrial Park.

No.	District	Length of Pipeline (km)	Tenure of Project-Affected Land[5]	Types Landowner Interests Held in Project-Affected Land[6]
			and Public Land (predominant)	
8	Lwengo	26.213	Private Mailo (predominant), Freehold, Leasehold, Unknown and Public Land	Private Mailo, Freehold, Leasehold, Kibanja, Lawful Occupants, Bonafide Occupants, Unknown and Public Land
9	Rakai	19.950	Private Mailo (predominant), Freehold, Leasehold and Public Land	Private Mailo, Freehold, Leasehold, Kibanja, Lawful Occupants, Bonafide Occupants and Public Land
10	Kyotera	32.266	Private Mailo (predominant), Freehold , Leasehold and Public Land	Private Mailo, Freehold, Leasehold, Kibanja, Lawful Occupants, Bonafide Occupants, Unknown and Public Land

There are three cultural institutions present in the Project area: the Buganda Kingdom (central Uganda), the Bunyoro-Kitara Kingdom (western Uganda) and the Kooki Chiefdom. A key feature for land ownership in the central region is the Buganda Kingdom with some Project-affected land held by the Buganda Land Board (BLB) and some Project-affected communities residing on this land. Land held under mailo tenure is generally confined to Buganda and Bunyoro.

The pipeline starts in districts predominantly under a customary tenure system, present in Hoima, Kikuube and parts of Kakumiro. Then as it enters the Buganda Kingdom in central Uganda with mailo tenure present in some parts of Kakumiro, and then the following seven (7) districts of Kyankwanzi, Mubende, Gomba, Sembabule, Lwengo, Rakai and Kyotera. There is limited land held in Uganda under freehold, there are though some Project-affected freehold land in eight (8) of the affected districts, as indicated above. Leasehold interests are also present within the pipeline corridor and PA sites.

2.6 SUMMARY OF DISPLACEMENT IMPACTS

For context this section summarises the displacement impacts of the Project land acquisition program which is the subject of this RAP. Further details on the affected communities and displacement impacts is provided in Chapter 5 (Socio-economic Baseline Summary) and Chapter 6 (Project impacts).

Table 2-5 summarizes the PAPs per District, the interests in land and land users as well as public institutions who held interests in affected land.

Table 2-5 Summary of PAPs and Key Displacement Metrics

Impacts	Hoima	Kikuube	Kakumiro	Kyankwanzi	Mubende	Gomba	Sembabule	Lwengo	Rakai	Kyotera	MCPY1	MCPY2	MCPY3 Sembabule	MCPY4 Kyotera	TOTAL
Length of pipeline (km)	5.5	30.4	33.4	14.7	63.7	17.0	52.6	26.2	19.9	32.3	-	-	-	-	**296**
Gross land take (Acres)[8]	74	252	264	120	565	139	473	217	163	256	47	47	61	62	**2,740**
Total land take valued within current Valuation Reports[9] (Acres)	34	233	222	73	472	133	373	198	142	232	47	47	61	54	**2,321**
Total number of PAPs	92	410	336	227	650	44	433	565	371	524	41	11	50	38	**3,792**
No. of PAPs with affected land interests[10]	73	338	290	145	545	25	356	452	316	444	33	8	37	34	**3,096**
No. of Institutional PAPs	0	0	2	4	7	3	21	2	7	19	0	2	1	4	72
PAPs with loss of crops and/or economic trees	78	359	364	209	642	35	407	500	304	439	37	16	45	31	**3,466**
Total no. of physically displaced PAHs (loss of dwelling)	8	43	15	13	58	1	18	18	7	13	0	1	2	1	**198**
No. of Absent /Absentee PAPs	0	0	1	2	11	1	9	9	18	15	0	0	0	0	**66**
No. of graves affected	4	12	12	25	50	0	33	115	82	164	0	0	0	2	**499**
No. of built shrines	0	0	0	0	0	0	0	2	4	1	0	0	1	0	**8**
No. of natural shrines (verified) [11]	0	0	2	0	2	0	1	0	2	0	0	0	0	0	**7**

[8] These are gross land takes that include government land like central forest reserve, wetlands, streams, etc. This does not compare with land take valued in the valuation reports, because what is indicated in the valuation reports includes mostly land to be compensated. It does not include land not surveyed or valued due to ongoing rectification issues, disputes and land not yet accessible

[9] Excludes areas unsurveyed due to rectification ongoing/disputes, Government / public land etc. – see footnote 8 above.

[10] Land owner interests refers to legally recognizable rights or claims to land ownership, covering: Mailo, Customary, Freehold, Leasehold, Lawful Occupant, Bonafide Occupant, Kibanja and Public Land. Land areas of Unknown ownership were also recorded during the surveys. The number of PAPs with land owner interests is lower than the number of interests because some PAPs have multiple land ownership interests.

[11] In addition to the 7 natural shrines which have been verified and valued, there are a further 9 natural shrines which have been identified from engagements with PAPs but not yet verified: 1 in Kikuube District, 1 in Kakumiro District, 6 in Rakai District and 1 in Kyotera District.

Landowners include all those with an interest in the land i.e. Mailo interest, freehold interest, leasehold interests, Public Land, kibanja, bonafide and lawful occupants. There may be multiple persons/entities with interests in the same parcel of land. Land users are licenses generally with varying agreements with land owners. PAPs may hold more than one interest in Project-affected land and may also be licensees on affected land. This means for persons or entities/institutions who hold interest in more than one affected land parcel they may have more than one valuation in the VRs and therefore may have been counted more than once in the PAP numbers. This is to take account of the complex multiple land interests along the pipeline corridor.

The main land acquisition and resettlement related impacts associated with the pipeline section in Uganda are summarized below. Chapter 6 presents in detail the Project displacement impacts from the land acquisition program.

- The pipeline will run for 296 km in Uganda from Kabaale to the Uganda-Tanzania border traversing:
  - Ten (10) districts;
  - 27 sub-counties and 3 town councils;
  - 171 villages;
- Project gross land requirements total 2,740 acres, 92% of which relates to the pipeline corridor and 8% to the Priority Areas.
- The Project has valued within the Valuation reports and will compensate for approximately 2,321 acres of land, much which under some form of agricultural land use. The remaining land affected by the Project footprint relates to: land already owned by Government which will not be acquired, including national central forest reserve and wetland areas; and land which currently has not been surveyed and valued (i.e. due to ongoing rectification issues, disputes etc.).
- A total of 3,792 PAPs are affected, comprising 3,096 PAPs with land interests and 696 licensees with structures, crops or trees growing on land owned by other PAPs.
- The 3,096 PAPs with land interests hold a total of 4,038 different landowner interests in affected land (i.e. freehold, leasehold, customary, mailo, kibanja, bonafide and lawful occupants). The higher number of land interests relative to the number of PAPs with land interests reflects the fact that PAPs can own more than one affected area and that certain land interests (lawful and bonafide occupants and kibanja) overlap other ownership interests.
- In addition, there are a total of 72 public institutional interests in land affected.
- Reflecting the linear nature of the Project, the majority of affected land areas will lose only a small proportion of their areas, with 70% losing less than 30% of their area, and only 15% of affected land areas losing 50% or more. This means that the livelihood impacts on the majority of PAPs will be relatively low, and PAPs will be able to continue a reasonable proportion of their land based livelihoods on their remaining.
- PAPs will though experience some level of economic displacement in the form of impacts on crops and trees, and a total of 3,466 PAPs (91% of PAPs) own crops and/or economic trees which are affected by the pipeline.
- Affected persons were noted to farm seasonal crops as part of their livelihood activities, however as these will be harvested prior to displacement these were not recorded for valuation purposes.
- The pipeline route and sites of AGIs have been carefully selected to minimize physical displacement. A total of 198 PAHs will experience some degree of physical displacement, i.e. loss of dwelling, which represents only 5% of all PAPs. Of these 198 households, 36 households have no recognizable legal rights or claims to the land they occupy, comprising:

29 households who are licensees; and 7 households living informally in the Taala Central Forest Reserve.

- A total of 1,376 structures owned by non-Institutional PAPs will be affected, including:
  - 219 residential dwelling structures;
  - 1,157 other structures, such as grain stores, livestock kraals, latrines, incomplete structures (33).
- A total of 34 structures owned by Institutions will be affected, including:
  - 2 classroom blocks;
  - 3 Church Houses and 2 Mosques; and
  - 27 other structures, such as latrines, ablution blocks, fences and bee hives.
- The existing affected houses are small and generally self-built by PAPs (and/or by their households):
  - Approximately 84% of the existing houses are less than 41m^2 (the smallest replacement House Type 1 – see Chapter 8).
  - Approximately 50% of existing houses are less than 20m^2 with a significant proportion of these much smaller than this.
  - Approximately 30% of existing houses are less than 15m^2.
- There are 499 marked graves affected by the Project. In addition, during the RAP surveys 168 unmarked grave records were noted for the Project record during the surveys. These will be investigated further during the implementation and once verified appropriately compensated for.
- There are 15 verified shrines affected by the Project, comprising: 8 built shrines and 7 verified natural shrines. In addition, there are a further 9 natural shrines which have not yet been verified or valued.
- The Project affects approximately 36 acres of land in the Taala Central Forest Reserve in Kyankwanzi District which the pipeline corridor traverses.
- The pipeline will cross a number of rivers, including the River Kafu, River Nabakazi and River Katonga and wetlands towards the Tanzania border and north-western corner of Lake Victoria.
- Project land acquisition program will affect a few public facilities buildings comprising two classrooms: one for a nursery school[12] in Mubende and one associated with a school in Sembabule.
- The pipeline will cross a number of public infrastructure crossings, including:
  - Roads:
    - 15 National roads;
    - 45 District roads; and
    - 234 community access roads.
  - One railway line under the jurisdiction of Uganda Railway Corporation crossed in the village of Kalyamawolu in Gomba district, railway line has been non-functional for a long time and runs from Kampala to Kasese;
  - Powerlines:
    - 4 transmission lines (high voltage) under the jurisdiction of UETCL; and

[12] MCPY-02 affects a classroom block however, this block is currently closed as could not meet the district requirements for permanent buildings.

- 16 distribution lines under the jurisdiction of UMEME and REA.

The figures provided are accurate at the time of issuing this RAP. However, modifications to figures may occur, for example if PAPs query their valuations and amendments are made. Any changes will be captured in a separate register of changes.

2.7 ACTIVITIES TO AVOID OR MINIMIZE DISPLACEMENT

International good practice requires that displacement be avoided or minimized wherever feasible through the assessment of alternative Project and engineering designs and the application of various criteria.

Project alternatives have been considered for:

- pipeline routing;
- siting facilities:
  - AGIs;
  - construction facilities;
- technology; and
- construction techniques.

The assessment of project alternatives is summarized below. Further details on the Project alternatives assessment, including the pipeline route selection and minimization of impacts are detailed in the ESIA[13].

2.7.1 Pipeline Routing

Several alternative pipeline routes were identified during the early stages of the development of the Project. The routing process began with the identification of regional areas of interest. This was followed by numerous screening studies to evaluate environmental, social, geo-hazards, constructability and terrain (including river crossings and slopes) constraints for pipeline routing at a broad scale.

This identification process culminated in the selection of eleven 50 km wide corridor combinations for more detailed evaluation. Secondary information was used to assess the potential corridors using a geographic information system (GIS) and three (3) corridor options were identified for further evaluation, two (2) through Kenya (northern and southern corridors) and one (1) through Tanzania.

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

Subsequently, the route corridor was reduced to two (2) km in width in 2016 and 2017 to 100 m wide. During 2018 the route corridor was reduced to a 30 m wide corridor within which, the construction and operational pipeline corridor will be located.

In the site selection process of these sites for these sites technical, environmental, socio-economic and cultural heritage criteria were considered including the following overriding requirements to:

[13] EACOP ESIA Uganda Section; January 2019

- Minimize land acquisition and physical displacement specifically;
- Minimize distances from the main road network where applicable;
- Avoid populated areas and nationally protected areas of biodiversity value; and
- Take cognizance of the terrain type and topography.

The Project is continuing to review the findings of the land acquisition, socio-economic household surveys and other surveys alongside the design to identify locations where physical and economic displacement impacts could be further avoided, reduced and/or minimised. This is an ongoing process and is being further informed by the engagement program with PAPs, PACs and other stakeholders.

2.7.2 Facility Siting

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

- AGIs; and
- construction facilities including MCPYs.

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

AGIs

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

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

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

The PS locations (PS-1 at Kabaale Industrial Park and PS-2 for EACOP Uganda) have been identified by the points on the pipeline where at maximum flow, the pressure in the pipeline falls (to approximately 6 barg); regard was also taken of topographical profile so as not to locate the PS in a deep dip. The initial locations identified for the pumps stations were visited early in the process and site visit findings used in the further development of the siting and design.

Construction Facilities

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

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

There is a requirement to establish four main camp and pipe yards (MCPY) within Uganda to

support construction operations. During the routing process for the pipeline, identified locations for the construction sites where subject to a preliminary assessment based on the technical criteria in Table 2-6.

Table 2-6 Construction Facility Location Selection Criteria

Technical	Environmental	Social
Facilitate access to pipeline corridor for the MCPY Facilitate access for pipes from main roads and rail for coating facility (CF) Availability of water Availability and capability of local contractors to undertake the required scopes	Limit footprint and impact by minimising requirements for temporary roads Avoid nationally protected sites and internationally recognised sites of conservation interest and critical habitats Topography Terrain type (avoiding wet areas) Potential geo-hazards (such as flood zones, faults)	Avoiding resettlement or limiting extent of resettlement Clear of villages and schools Social and community infrastructure (including places of worship) Settlements (urban area, town, village) Cash crop (e.g., tea, coffee plantation, sisal, sugar cane, banana) Water points, sources and wells Cultural heritage sites Tourism facilities and sites Land use Avoid the clearance of trees/timber forests, existing crops and bush in dry areas (where crops would be easier to restore) Clear of military facilities

Each of the MCPY locations identified in Uganda have been evaluated and the optimum locations selected. During the ongoing assessment process each of the MCPY locations at least three options were identified. During the land acquisition surveys the findings from fieldwork and engagement was then used to inform the final selection of the MCPY site locations.

2.7.3 Technology

Technology alternatives were considered for the pipeline, pumps, power generation, insulation and heating:

Pipeline

A partially above ground pipeline alternative was considered during early stages of Project development but was discounted for numerous reasons including issues associated with security and safety, risk of interference by third parties, permanent land take, visual impacts and impacts to large wildlife movement. The concept selected for study was a trenched and buried pipeline.

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

- a cold transport option requiring the partial removal of paraffinic components ensuring that gelling of the oil is prevented. This requires some oil processing and is extremely expensive. Consequently, this alternative was screened out; and

- a hot transport option aimed at maintaining the fluid temperature above 50ºC with the use of thermal insulation, and a combination of heating options. Hot transport was selected as the base case for further study.

Pumps

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

Insulation

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

Three types of insulation were considered: polyurethane foam (PUF); glass; and pipe in pipe (PiP). PUF was selected as the base case as it offers the highest thermal efficiency with lowest capital expenditure.

Heating

Three heating configurations were considered:

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

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

2.7.4 Construction Techniques

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

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

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