

EAST AFRICAN CRUDE OIL PIPELINE PROJECT



**EACOP FEED OVERVIEW – UGANDA UPCOMING OPPORTUNITIES
WORKSHOP 17-JANUARY-2018**



UGANDA NATIONAL CONTENT WORKSHOP 17-JANUARY-2018

WORKSHOP AGENDA

- Opening comments:
 - MEMD
 - PAU
- SAFETY MOMENT
- Introduction to Gulf Interstate Engineering & FEED
- FEED Technical Descriptions for the EACOP Export Pipeline and Pump Stations within the Uganda area
- Codes and Standards requirements for the EACOP material, services and construction
- Overview of TIER 1 Contracts Scopes of Work
- Services and support required during the pre-construction phase of the Project
- Type of Labor Requirements
- Tier 1,2,3,4 structure examples for service providers
- Local Uganda communities in close proximity of the EACOP permanent installation
- Closing Comments

- Lunch

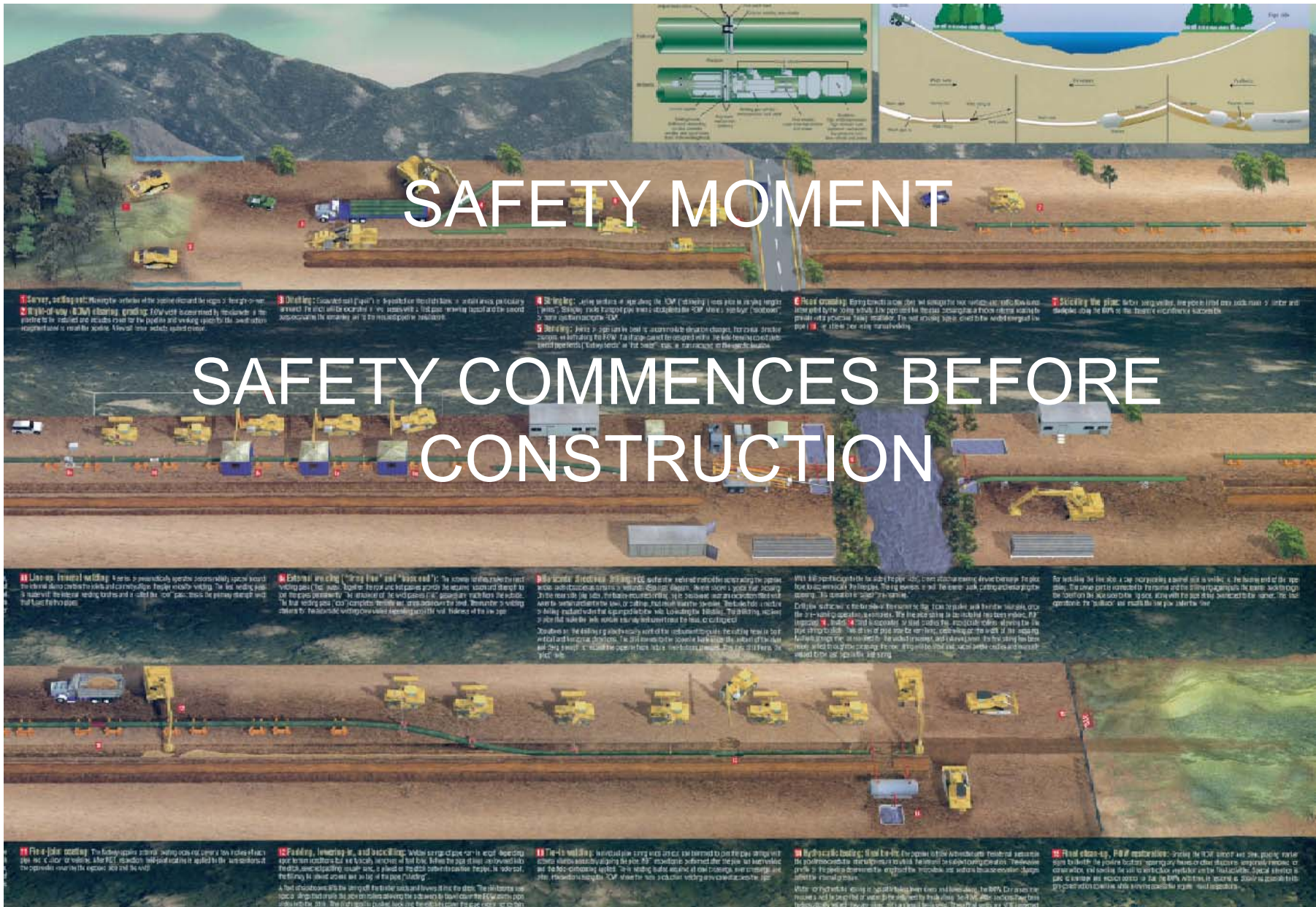


STANDARDS FOR CONTRACTING OF GOODS & SERVICES

The EACOP Project and Contractors will be responsible for pre-qualifying the providers of goods and services for the construction of the EACOP Project. Standards they will require from each provider to meet:

- **Quality**
 - Goods and Services must meet specified ISO standards, international codes and standards, "fit for purpose", documented history of previous services for major projects and meets availability/reliability requirements.
- **Cost**
 - Provides the most economically competitive offering while meeting the other standards listed
- **National Content**
 - The level of use of Ugandan labour, local expertise, goods and services, Ugandan Companies, registered entities, Ugandan citizens and proposals for technology transfer.
- **Planning**
 - Demonstrates the capability of developing and maintaining plans to meet the schedule requirements and history of successful compliance on other projects
- **Ethics and compliance**
 - Conduct all business matters in the highest of ethical standards and comply with Uganda and IFC/World Bank guidelines
- **Safety**
 - Demonstrate established health and safety procedures use on previous projects and statistical proof of safety incident history





SAFETY MOMENT

SAFETY COMMENCES BEFORE CONSTRUCTION

1. Survey, set-backs: Mapping the location of the pipeline along the route of the right-of-way (ROW) clearing, grading, etc. is determined by the surveyor to be installed and set-backs for the pipeline and working space for the construction equipment to be used.

2. Detailing: Excavated soil (spoil) is deposited on the right-of-way (ROW) and is not to be used for any other purpose. The spoil is to be used for the construction of the pipeline and the working space for the construction equipment.

3. Stringing: A line is strung along the ROW (right-of-way) to mark the location of the pipeline. The line is strung along the ROW and is not to be used for any other purpose. The line is strung along the ROW and is not to be used for any other purpose.

4. Head clearing: The head clearing is the first step in the construction of the pipeline. It involves the removal of the vegetation and the topsoil from the ROW. The head clearing is the first step in the construction of the pipeline.

5. Setting the pipe: The pipe is set in the ground and is not to be used for any other purpose. The pipe is set in the ground and is not to be used for any other purpose.

6. Line-up, trenching: A series of parallel lines are drawn across the ROW. The lines are drawn across the ROW and are not to be used for any other purpose. The lines are drawn across the ROW and are not to be used for any other purpose.

7. Excavation: The excavation is the first step in the construction of the pipeline. It involves the removal of the soil from the ROW. The excavation is the first step in the construction of the pipeline.

8. Backfilling: The backfilling is the first step in the construction of the pipeline. It involves the replacement of the soil that was removed during the excavation. The backfilling is the first step in the construction of the pipeline.

9. Compaction: The compaction is the first step in the construction of the pipeline. It involves the use of heavy machinery to compact the soil. The compaction is the first step in the construction of the pipeline.

10. Final inspection: The final inspection is the last step in the construction of the pipeline. It involves the inspection of the pipeline by a qualified person. The final inspection is the last step in the construction of the pipeline.

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PETROLEUM AUTHORITY OF UGANDA



GULF INTERSTATE ENGINEERING

EACOP ESSH OVERVIEW

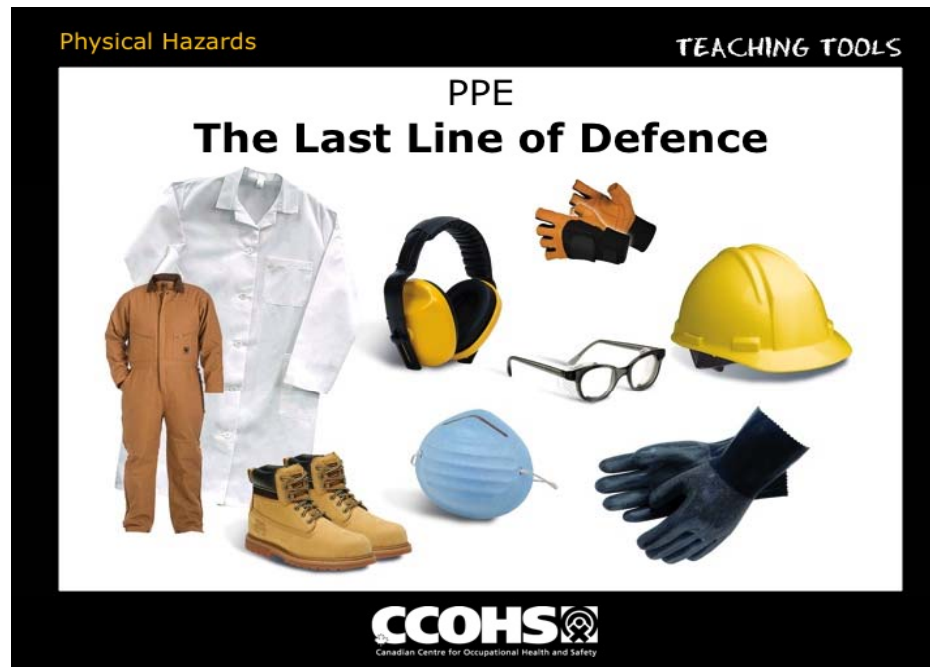
- The EACOP Project will originate in Kabaale and construct 296km to the border of Uganda and Tanzania
- The construction pipeline corridor (Right of Way) is 30m wide and each pump station is 300m x 410m is size
- While the physical construction is limited to these specific geographical areas, Environmental, Safety, Societal and Health management will be undertaken inside and outside these boundaries.
- The EACOP Project and selected EPcm Contractor will be focused on the mandatory compliance by each of the service providers of the Uganda laws and regulations, IFC principles and project specific procedures and requirements to mitigate the risks to the construction work force and the Uganda citizens that will encounter the various aspects/activities of the undertaking.
- Qualified and trained Safety Inspectors will be assigned to each of the construction sites to monitor, report and participate in daily toolbox safety meetings – to keep a focus on SAFETY FIRST.



SPECIFIC CONSTRUCTION SAFETY

TRAINING – TRAINING – TRAINING “SAFETY FIRST”

- **Use proper personal protective equipment (PPE)** - Personal protective equipment includes any apparatus or garment intended to protect you from injury or illness. Eye and hearing protection, safety boots, gloves and hard hats should always be worn on pipeline jobsites. Each construction worker, vendor, supplier and site visitor will be required to undergo a site safety training session before access to the site(s) and comply with the PPE stipulations.



PIPELINE CONSTRUCTION TRAINING

- Site Construction crews will be provided training that includes all aspects and phases of the construction. As the pipeline has a boundary of approximately 390km, the risk of safety incidents are far greater with the different stages of construction along the route.
- **Open Trench Training** – Thoroughly check subsurface conditions before digging, verifying that all underground utilities are marked and their depths noted. Before beginning work in an excavation, consider the hazards and ensure that a competent person has inspected the trench for proper sloping or benching and the use of protective systems. Secure warning tape/fencing along pedestrian openings



CONSTRUCTION EQUIPMENT TRAINING

- **Heavy Equipment Training** - Equipment operators must read and understand the Operation and Maintenance Manuals (OMMs) of all equipment they operate on the jobsite. Tests will be given to ensure the operators have a full understanding and skills to operate the heavy equipment. Primarily the operator must ensure that load and reach limitations are obeyed and a spotter is positioned to provide information to the operator of clearance and potential blind spots.



A CLEAN SITE IS A SAFE SITE

- **Construction Laborers Training:** Laborers and helpers are key to maintaining a clean site free of debris and trip hazards. Slips, trips and falls are best avoided with good housekeeping. Keep walkways clear of tools (welding leads, extension cords, etc.) and debris; clean spills immediately; and, make it clear others are expected to do the same.



- **Eye Protection Training** - Eye injuries related to grinding of welds, welding, cutting of materials and contact with chemicals are preventable with both the proper personal protective equipment and safe work practices. Construction personnel will have various eye and face protection available based on the kinds of hazards to be encountered. Each will be instructed to avoid touching their eyes without the thorough washing of their hands first.



LIFTING SAFETY

- **Lifting Training** – On most construction projects, manual labor is used to help set up work stations, moving of miscellaneous equipment and material and lifting of materials/equipment from containers or trucks. All construction personnel, office or field, will be provided training on the positions for proper lifting to avoid back strains that may last long after the project is completed.



- **Hand and Power Tools Training** - Hand and power tools – from hammers and pipe wrenches to pneumatic, electrical and hydraulic equipment are essential on most construction projects. The training of the proper inspection and use of each type of tool will be provided to specific types of skilled trades personnel before they are allowed to use type of tool. Inspects of all components for cracks, leaks, cuts or excessive wear will be performed by designated individuals prior to and after each tool is used.



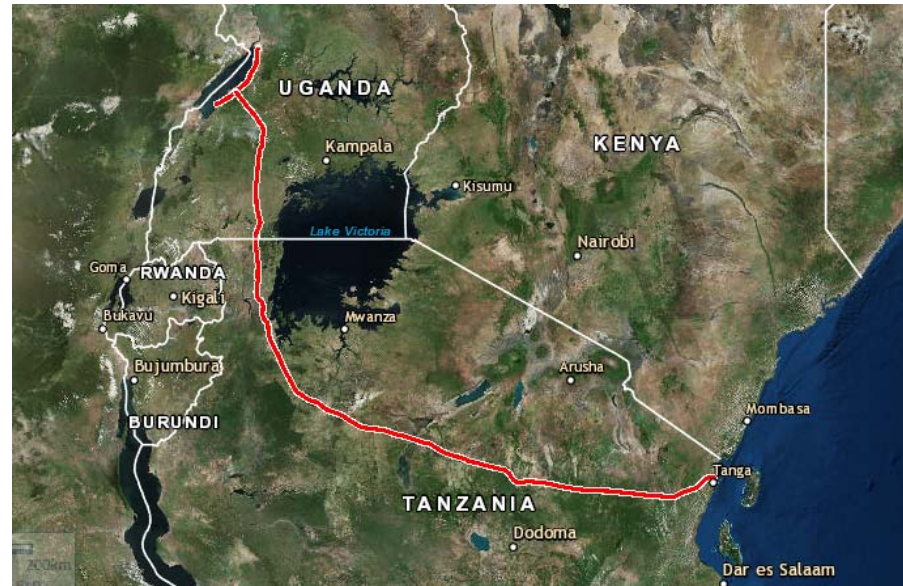
SPECIAL TEST TRAINING

- **Testing Procedures** - Special tests will be conducted for pipeline and pump station installations related to pipe pressure tests and HV cables phasing tests. Testing personnel will be trained to inspect all equipment and materials required by the written test procedure, ensuring it is in safe working order and confirm specified rating of the material/equipment limits. The Testing supervisor will ensure the the test area has been cleared of unauthorized personnel.





INTRODUCTION TO GULF INTERSTATE ENGINEERING



WHO IS GULF INTERSTATE ENGINEERING

- **GULF**, a US based company that was formed in 1953, provides project management, engineering, procurement and construction management services to the worldwide pipeline industry.
- **GULF** focuses on pipelines and has worked on **every major pipeline** project in the world during the **past 20 years**.
- **GULF** has just completed one of the largest and most recent projects on an EPCM basis in the past 5 years :
 - The 825-kilometer, 36"-diameter **Sabal Trail Pipeline**, a **\$3.5 billion** pipeline transporting over of 1 billion cubic feet per day of natural gas.
 - The Sabal Trail Pipeline was awarded Platt's **Construction Project of the Year for 2017**.
- **GULF** has experience with **heated crude oil pipelines** in Africa, South America and with the **longest heat-traced pipeline** in India.



GULF INTERSTATE ENGINEERING EACOP INVOLVEMENT

- **GULF** was selected to assist with the **2015 Conceptual Engineering Study** and **2016 Feasibility Engineering Study** that concluded with the selection of the Uganda-Tanzania EACOP Pipeline Route.
- **GULF** was awarded the **Front-End Engineering Design** contract to advance the preliminary engineering and design for the EACOP project.
- **GULF** is currently competing for the **EPcm Contract** for the next phase of the EACOP project.
- **GULF** is conducting this workshop to review the FEED findings.





EACOP FRONT END ENGINEERING SCOPE & DELIVERABLES



FRONT-END ENGINEERING – WHAT DOES THIS INVOLVE?

- *A technical engineering and design phase of a project to:*
 - *Identify and apply codes and standards for the specified material, equipment and construction works to be used by the EPcm, epC Contractors and all material and equipment suppliers;*
 - *Advance the feasibility design for the final selection for the pipeline route and locations of the permanent operational facilities and temporary construction camps;*



FRONT-END ENGINEERING – WHAT DOES THIS INVOLVE?

- Investigate the environmental, societal and health related sensitivities of the recommended route and make adjustments to avoid protected areas;
- Generate drawings and specifications to be used for the bidding and award of the various major contracts associated with the EACOP Project;



OVERVIEW OF FEED PROCESS

- Sanctioned by the Uganda Ministry of Energy and Mineral Development with the official launching ceremony in January 2017
- Advanced the conceptual design and established a recommended route for the EACOP pipeline system that meets environmental, societal, safety, health and economic goals
- Engineered the pipeline system from a “safety first” philosophy with optimum availability and high reliability standards
- Utilized LIDAR generated data and multiple Ground Truthing missions to validate actual site conditions
- Focused on the primary execution challenges to be anticipated during the implementation related to transport of material, equipment and construction contractors
- Identified opportunities related to National Content involvement for qualified Ugandan service providers



THE REPUBLIC OF UGANDA

MINISTRY OF ENERGY AND MINERAL DEVELOPMENT

PRESS RELEASE

LAUNCHING OF FRONT-END ENGINEERING DESIGN FOR THE EAST AFRICAN CRUDE OIL PIPELINE PROJECT

The Ministry of Energy and Mineral Development of the Republic of Uganda together with the Ministry of Energy and Minerals of the United Republic of Tanzania and the Lake Albert upstream Partners (CNOOC, Total and Tullow) are working together to develop a crude oil export pipeline (The East African Crude Oil Pipeline - EACOP) from Kabaale (in Hoima District, Uganda) to Tanga (in Tanzania). Various pre-development studies have been carried out on the pipeline route and meetings held which concurred on the framework for the project. Project teams are in place to ensure smooth implementation of the project on a fast-track basis, with the goal to commission the pipeline for operation by 2020.

On 9th January 2017, the Front-End Engineering Design (FEED) study for the EACOP project will be launched in Kampala. The FEED will develop the EACOP project Basic Engineering that will form the basis for Detailed Engineering, Final Investment Decision, and lead to the project execution and construction phase for the pipeline.

The FEED activities are critical to the implementation of the project and are estimated to last for a period of 8 months, involving a composite team of engineers and relevant discipline specialists from the FEED contractor and EACOP project participants above.

Dr. Stephen R. Isabaliija
PERMANENT SECRETARY



PETROLEUM AUTHORITY
OF UGANDA



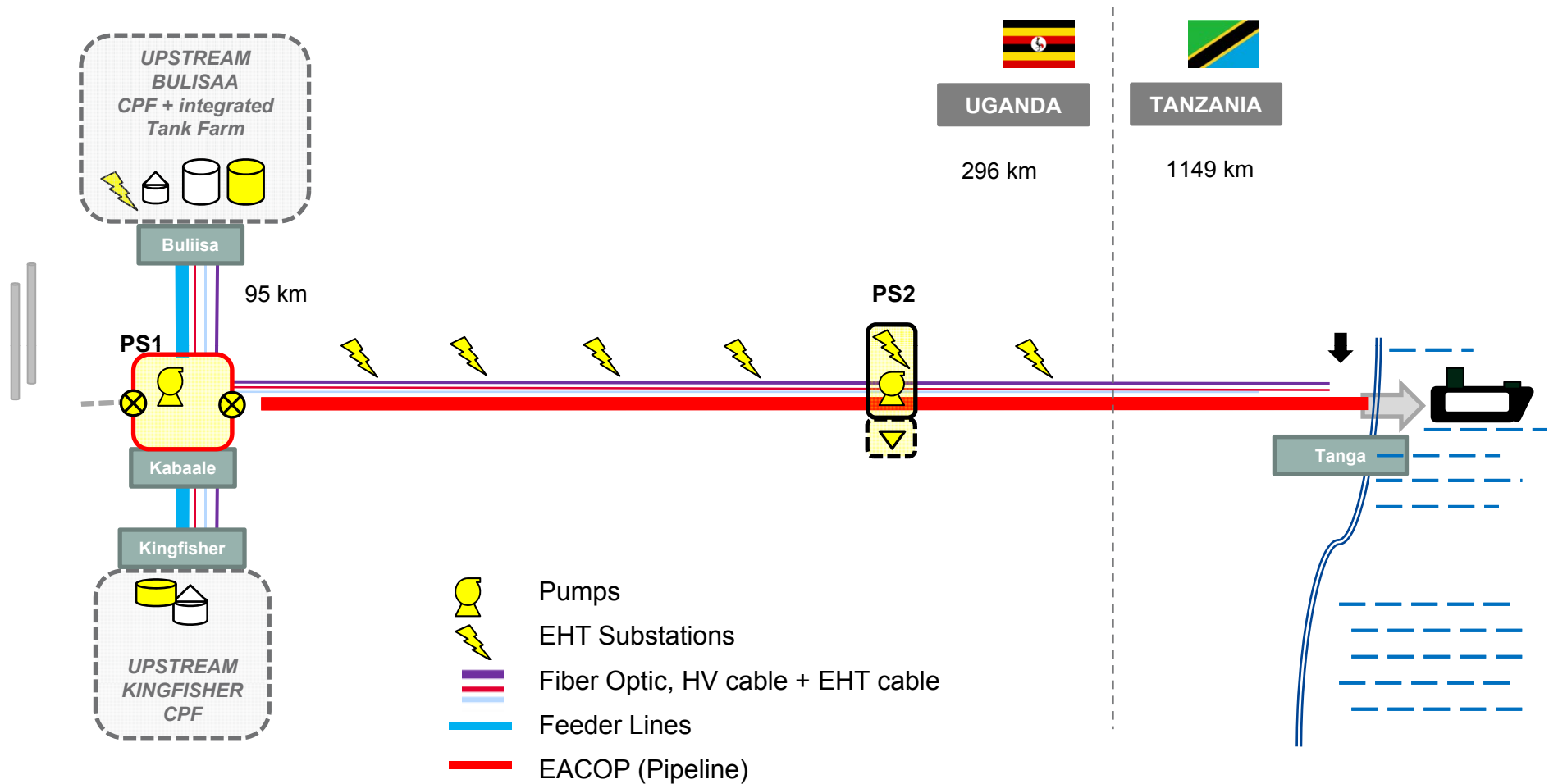
GULF INTERSTATE
ENGINEERING

The map illustrates the proposed railway network connecting Kenya and Tanzania. Key features include:

- Geographical Context:** The map covers parts of Kenya, Uganda, Rwanda, Burundi, and Tanzania. Major bodies of water shown are Lake Victoria, Lake Tanganyika, Lake Malawi, and Lake Malawi.
- Urban Centers:** Major cities like Kampala, Nairobi, Arusha, and Mwanza are highlighted. Other significant locations include Kisumu, Eldoret, and Mombasa.
- Railway Routes:** The proposed routes are marked with red and orange lines. Key points along these routes are labeled with codes such as PS-1, PS-2, PS-3, PS-4, PS-5, PS-6, PS-7, PS-8, PS-9, PS-10, PS-11, PS-12, PS-13, PS-14, PS-15, PS-16, PS-17, PS-18, PS-19, PS-20, PS-21, PS-22, PS-23, PS-24, PS-25, PS-26, PS-27, PS-28, PS-29, PS-30, PS-31, PS-32, PS-33, PS-34, PS-35, PS-36, PS-37, PS-38, PS-39, PS-40, PS-41, PS-42, PS-43, PS-44, PS-45, PS-46, PS-47, PS-48, PS-49, PS-50, PS-51, PS-52, PS-53, PS-54, PS-55, PS-56, PS-57, PS-58, PS-59, PS-60, PS-61, PS-62, PS-63, PS-64, PS-65, PS-66, PS-67, PS-68, PS-69, PS-70, PS-71, PS-72, PS-73, PS-74, PS-75, PS-76, PS-77, PS-78, PS-79, PS-80, PS-81, PS-82, PS-83, PS-84, PS-85, PS-86, PS-87, PS-88, PS-89, PS-90, PS-91, PS-92, PS-93, PS-94, PS-95, PS-96, PS-97, PS-98, PS-99, PS-100.
- Infrastructure:** The map shows existing roads, rivers, and other infrastructure. Key roads like the Mombasa-Nairobi Highway and the Nairobi-Kisumu Highway are visible.
- Political Boundaries:** The map clearly delineates the borders between Kenya, Uganda, Rwanda, Burundi, and Tanzania.



EACOP UGANDA & TILenga FEEDER LINE SCHEMATIC



216 kbopd Design rate
Hot Export Concept (*temperature maintained at 50°C*)



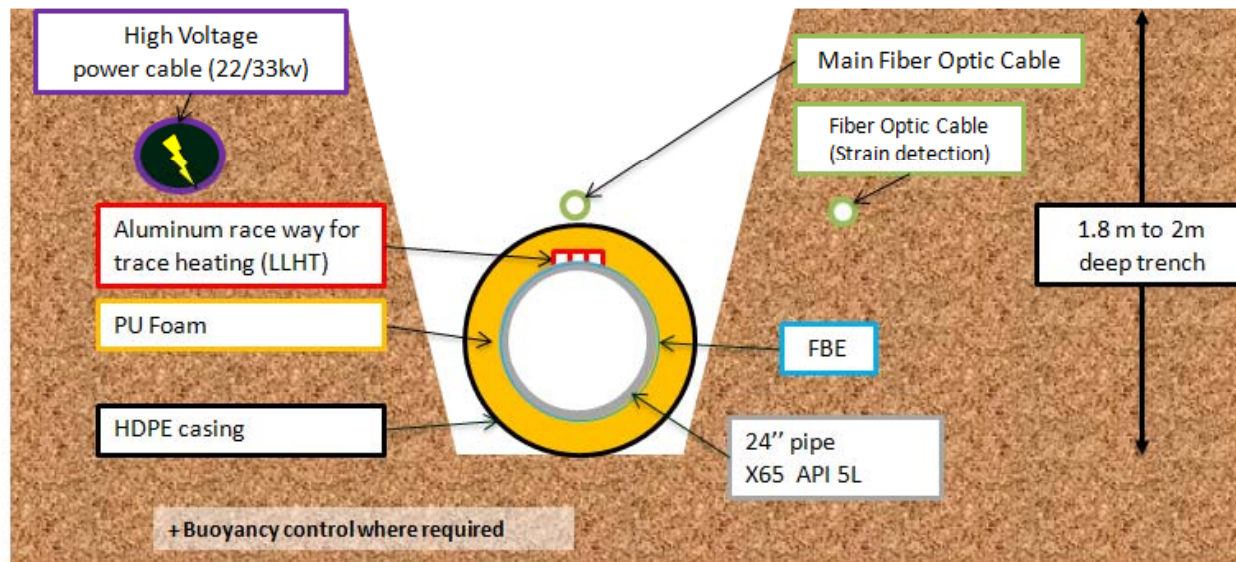
TECHNICAL ATTRIBUTES OF UGANDA EACOP & TILENGA FEEDER

- Tilenga to Kabaale Feeder Pipeline
 - 95 KM of 24" pipe = 7,917 joints : 14,400 Tons
 - 96 KM of 33 kV HV Power Cabling to Heat Trace power input
 - One (1) Pipe Storage Camp
- Kabaale to Uganda Border Pipeline Segment
 - 296 KM of 24" pipe = 24,670 joints : 45,528 Tons
 - 230 KM of 33 kV Power Cabling for Heat Trace power input
 - 2 Crude Oil Pump Stations with capability of 216 kbopd
 - 296 KM of Fiber Optic Cabling
 - Five Pre-Fabricated Engineered Electrical Heat Trace Substations
 - Three (3) Temporary Pipeline Construction Camps
 - Two (2) Temporary Construction Camps at Pump Stations
 - 5.3 KM of Temporary Access Roads
 - 11.7 KM of Permanent Access Roads w/existing roads upgrades



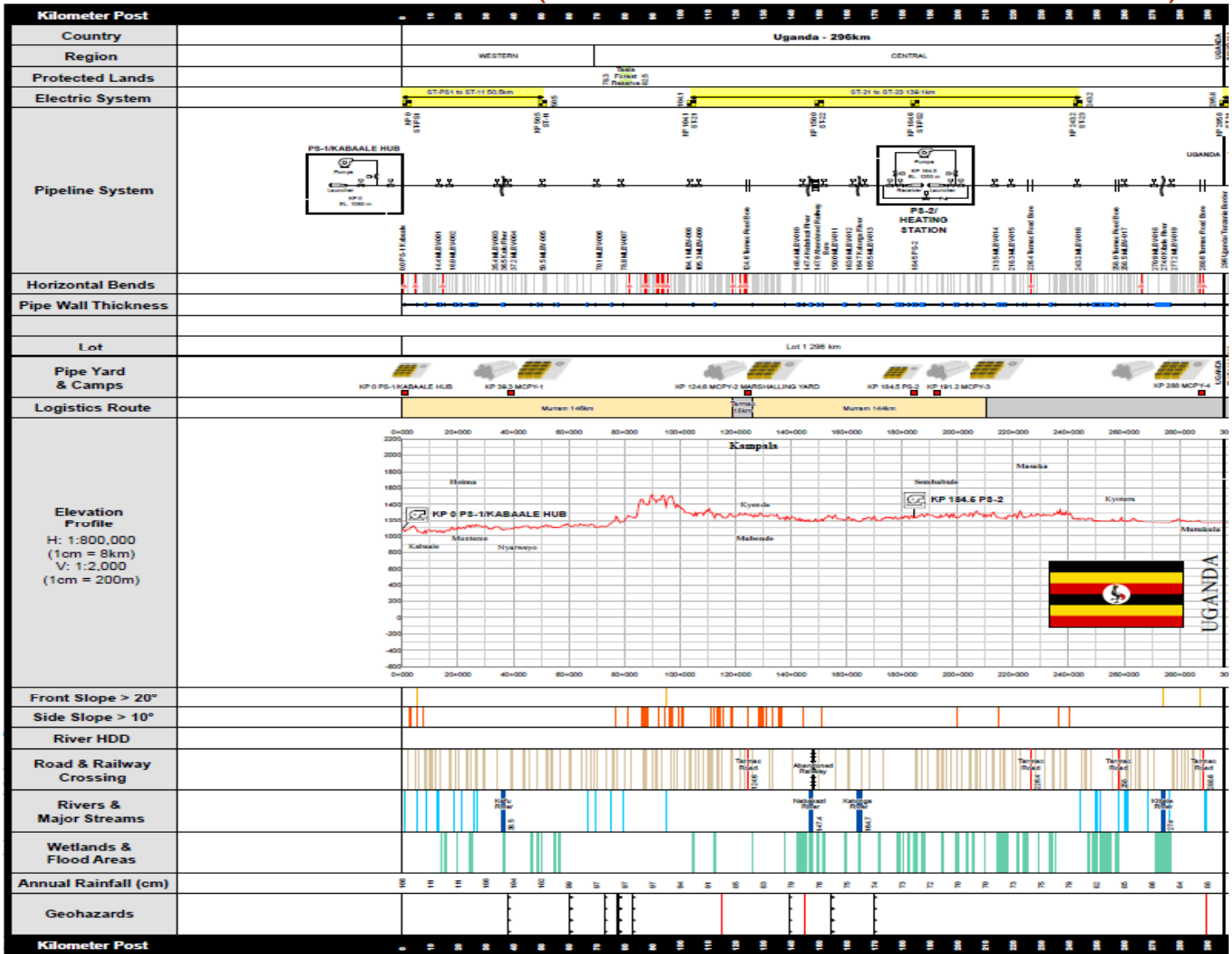
PIPELINE CHARACTERISTICS

- Pipeline will be insulated with 70mm of Polyurethane foam (PUF) material for heat retention
- The pipeline will have a heating system designed to maintain the temperature of the waxy crude oil above 50° C so that the wax remains in solution.
- The heating system consists of Electrical Heat Trace (EHT) cables powered through a buried High Voltage cable (33 kV) that feeds EHT substations and Mainline Valve sites along the route. The EHT cables (6.6 kV) provide up to 30 W/m of heat.



UGANDA EACOP PIPELINE SYNOPTIC

ALL FACILITIES LOCATIONS (w. MAIN LINE BLOCK VALVES)



PIPELINE ROUTE CHARACTERISTICS

- Along the Uganda route portion, the EACOP Pipeline will encounter approximately 120 crossing, per Table 1 below, and reach a maximum elevation of 1532 m above sea level at approximately 100km from Kabaale Hub. A second pumping station (PS2) will be located approximately 100km prior to crossing into Tanzania.

UGANDA		
TYPES OF CROSSING	COUNT	LENGTH (M)
Murram Roads	92	1380
Power Line	1	15
Perennial Rivers	4	2068
Perennial Streams	1	45
Seasonal Streams	18	1658
Tarmac Roads	4	120

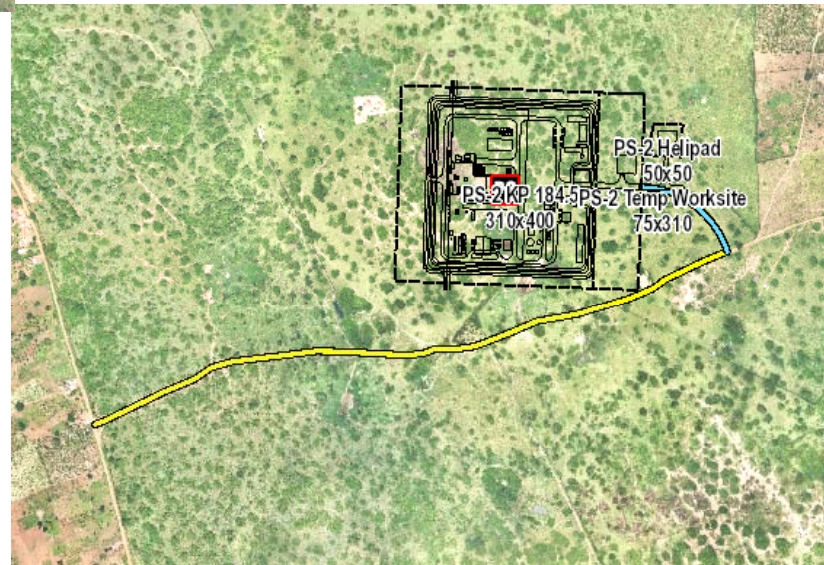


OVERVIEW OF PUMP STATIONS

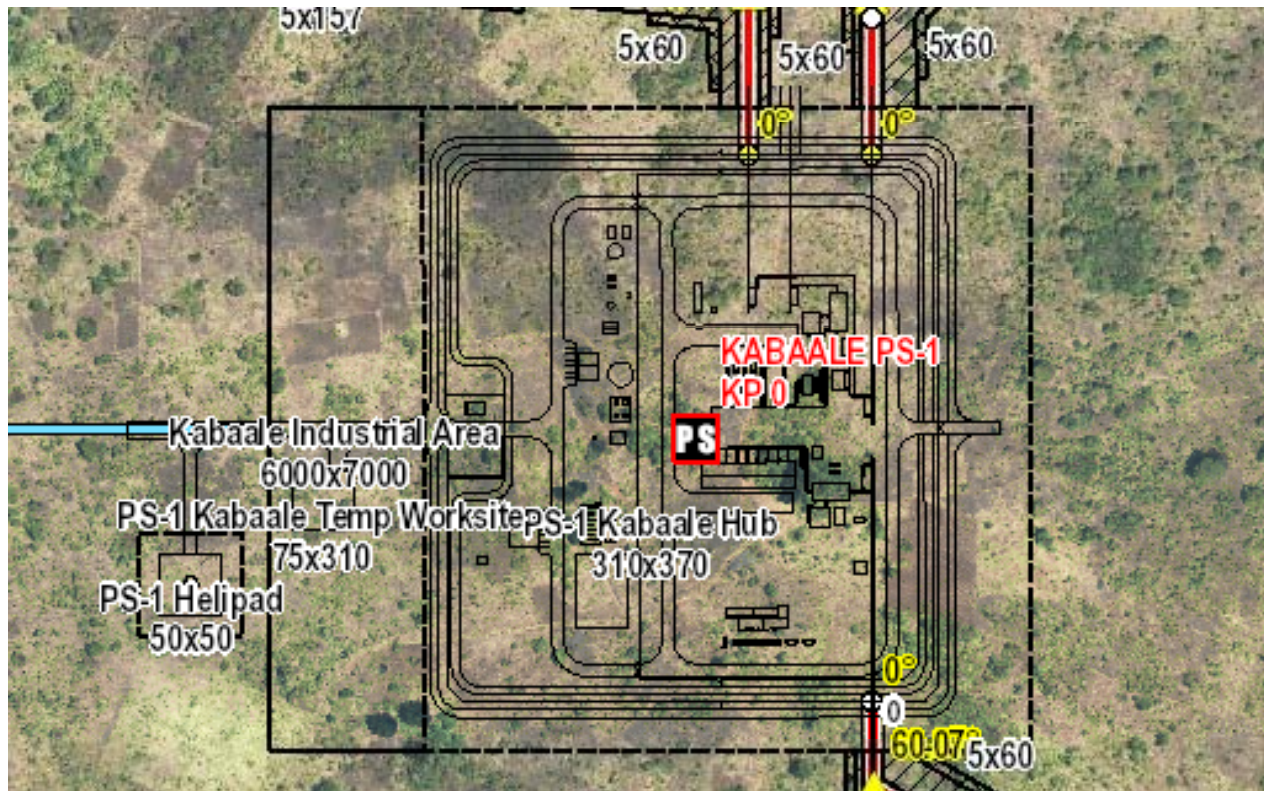


Pump Station #1 will be located at the Kabaale Hub within the area designated for the refinery. Electrical power supply will be provided from the Tilenga CPF.

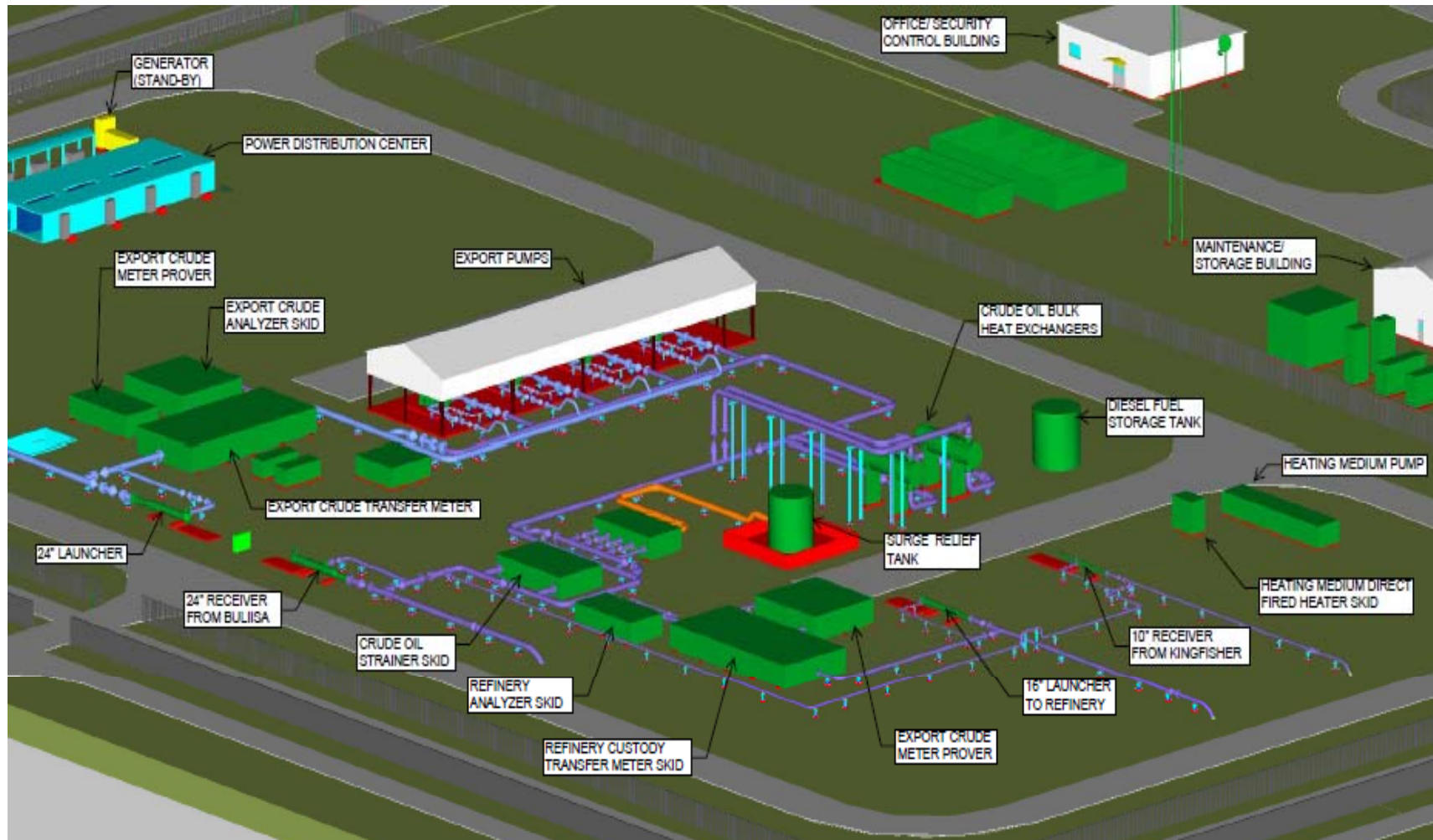
Pump Station #2 will be approximately 184km southeast of PS#1 and 106km from the Uganda Tanzania border. Electrical power for the pump station will be produced within the facility from three (3) electric generation units.



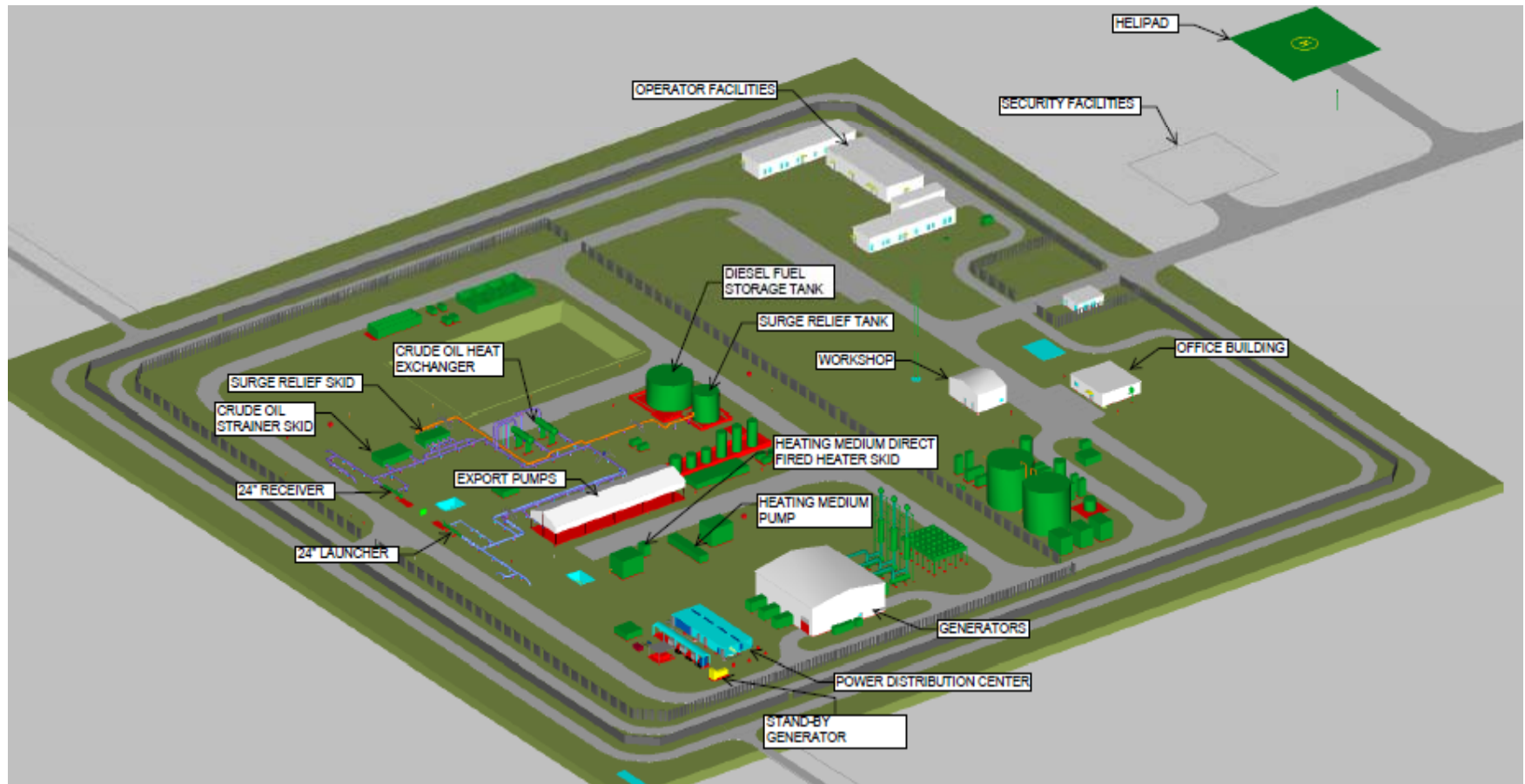
PUMP STATION#1 GIS GENERATED OVERVIEW



PUMP STATION #1 3D MODEL VIEW



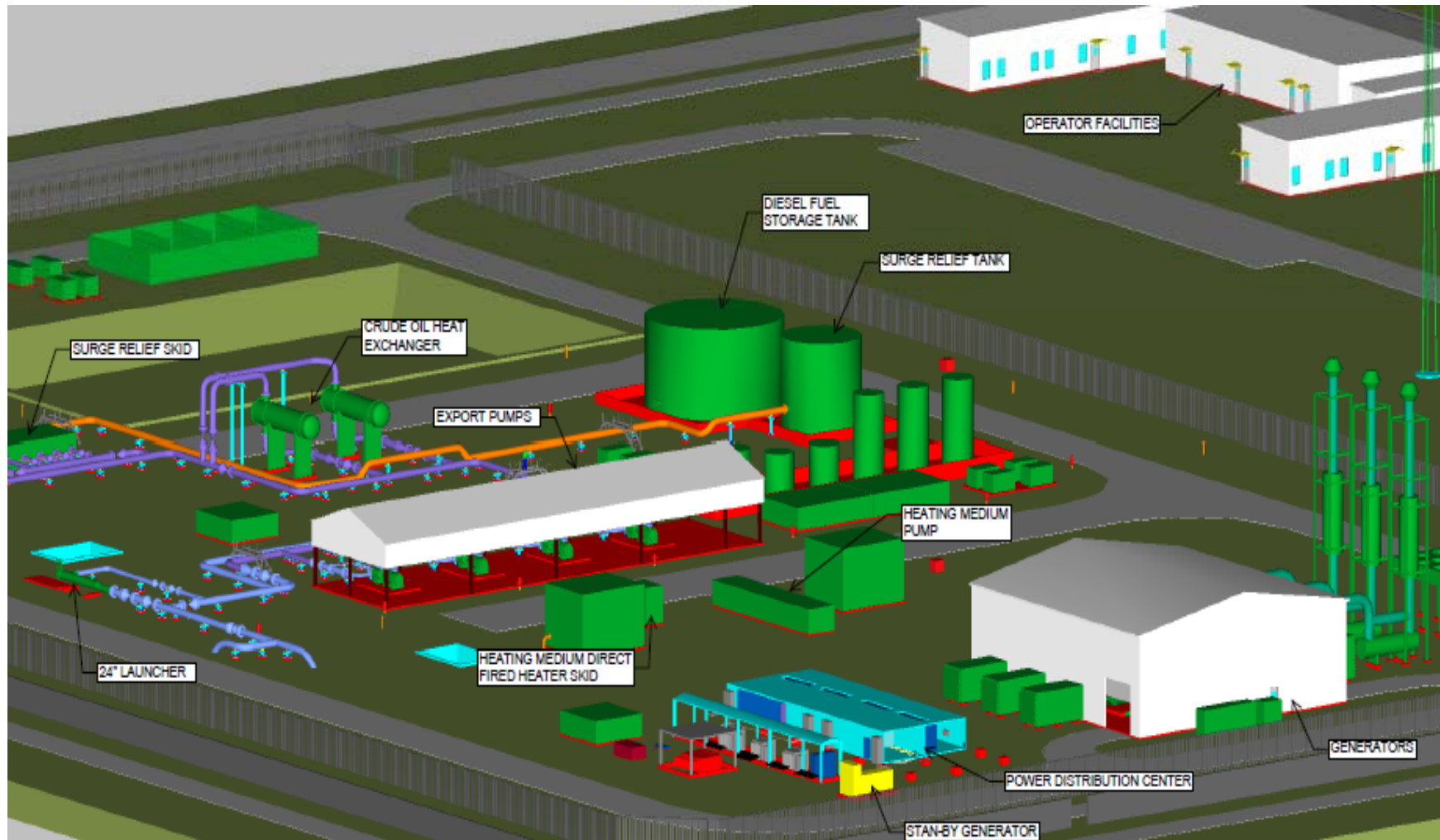
PUMP STATION #1 TOTAL PLOT PLAN VIEW



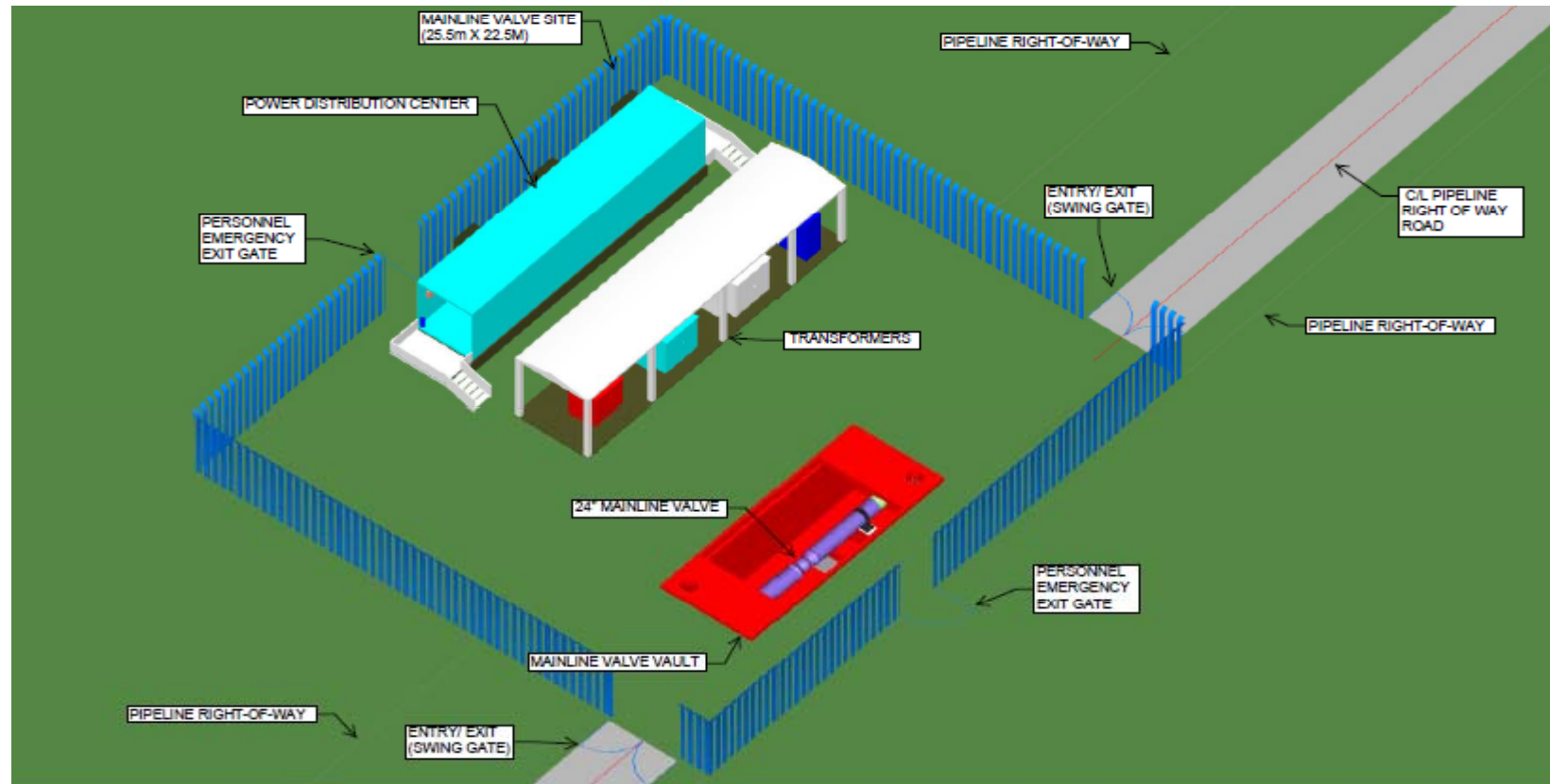
PUMP STATION #2 GIS GENERATED OVERVIEW



PUMP STATION #2 3D MODEL VIEW



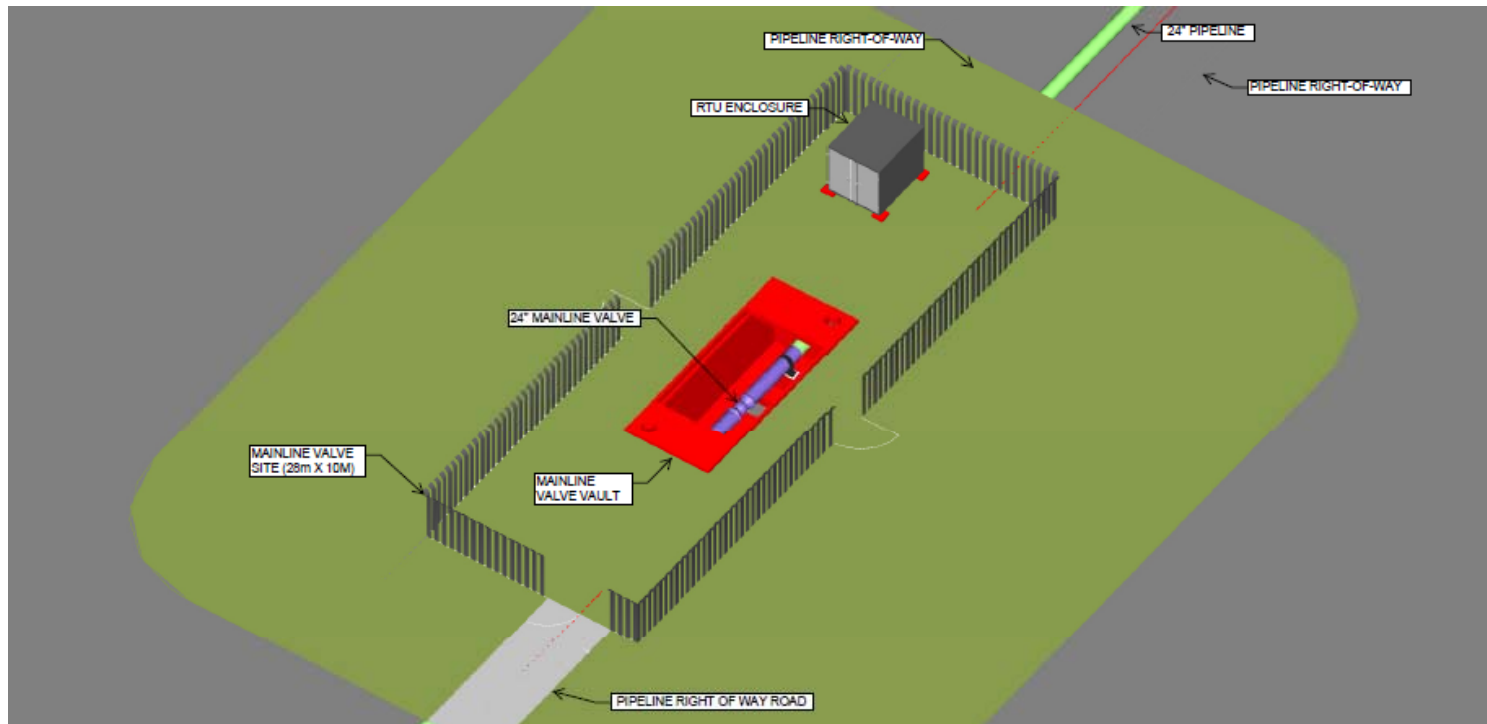
ELECTRICAL HEAT TRACE SUBSTATION 3D MODEL VIEW



- *Each of the five (5) Electrical Heat Trace Substations are required to provide power input to the heat trace cables on the pipeline.*
- *Power distribution centers are to be pre-fabricated .*



MAIN LINE BLOCK VALVES



- *Main Line Block Valves (MLBV) are specialty fabricated items that are electronically activated and used to isolate pipeline sections*
- *MLBV's will be vaulted underground with fencing & pre-fabricated RTU cabinet for remote control operations (open/close)*
- *Uganda pipeline has 24 MLBV's to be installed by the epC Pipeline Contractor*



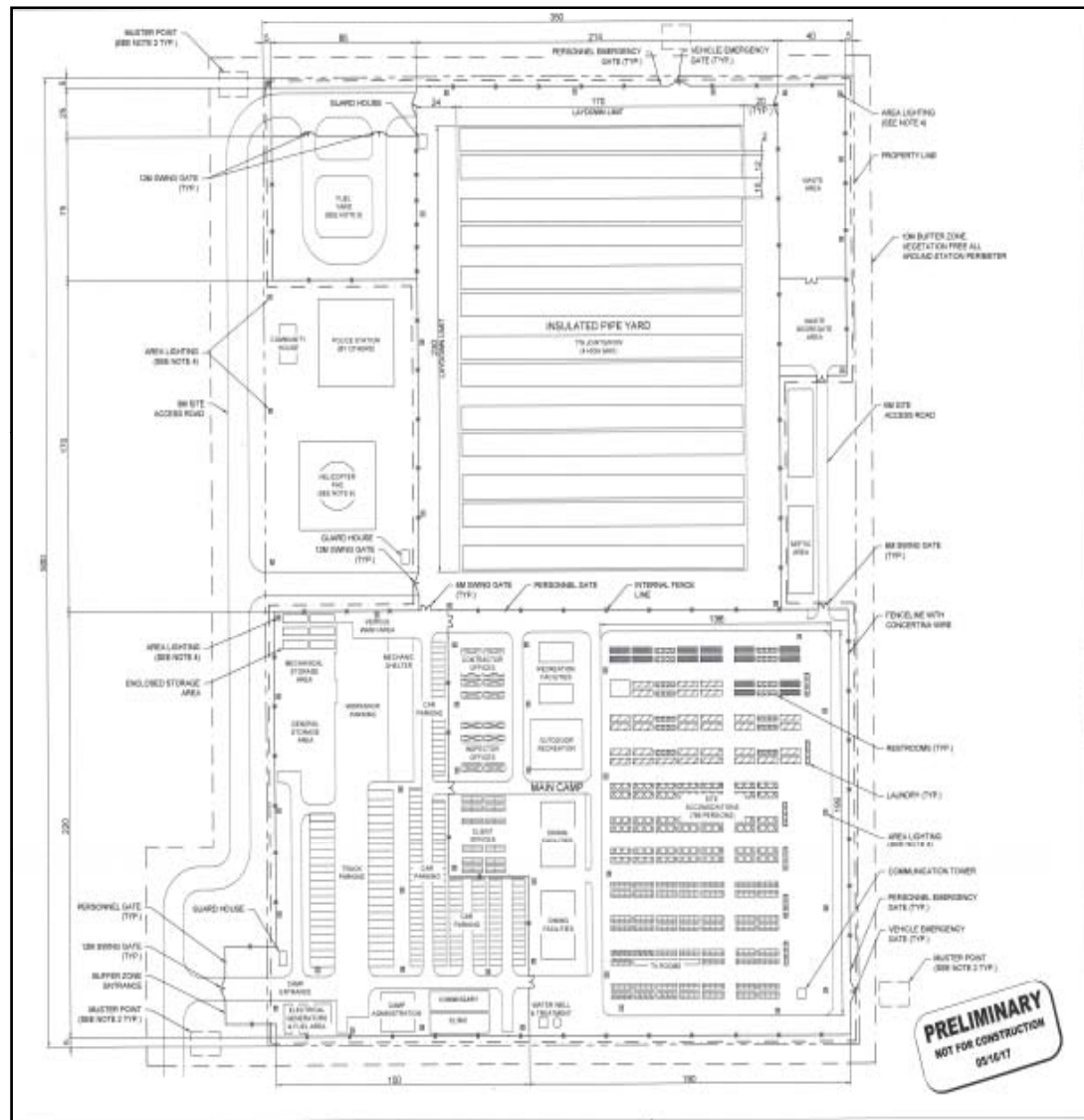
VIEW OF CONSTRUCTION CAMP/PIPE YARDS



- *Construction & Pipe Yard Camp #1 - Typical*
 - ✓ *Clearing & Leveling Will be part of Early Civil Works*
 - ✓ *350m x 500m grading/backfill = 132,000 cm*
 - ✓ *24 hours per day 7 days per week security*
 - ✓ *Site restored after project completion*
- Preparation for Pipeline Construction Camps
 - Create Temporary Access Roads
 - Drill Temporary Water Wells
 - Grade and backfill sites plus establish storm water runoff retention areas
 - Segregate areas for storage, maintenance, tools/consumable warehouses, housing and fuel storage, waste treatment and pipe storage/berms



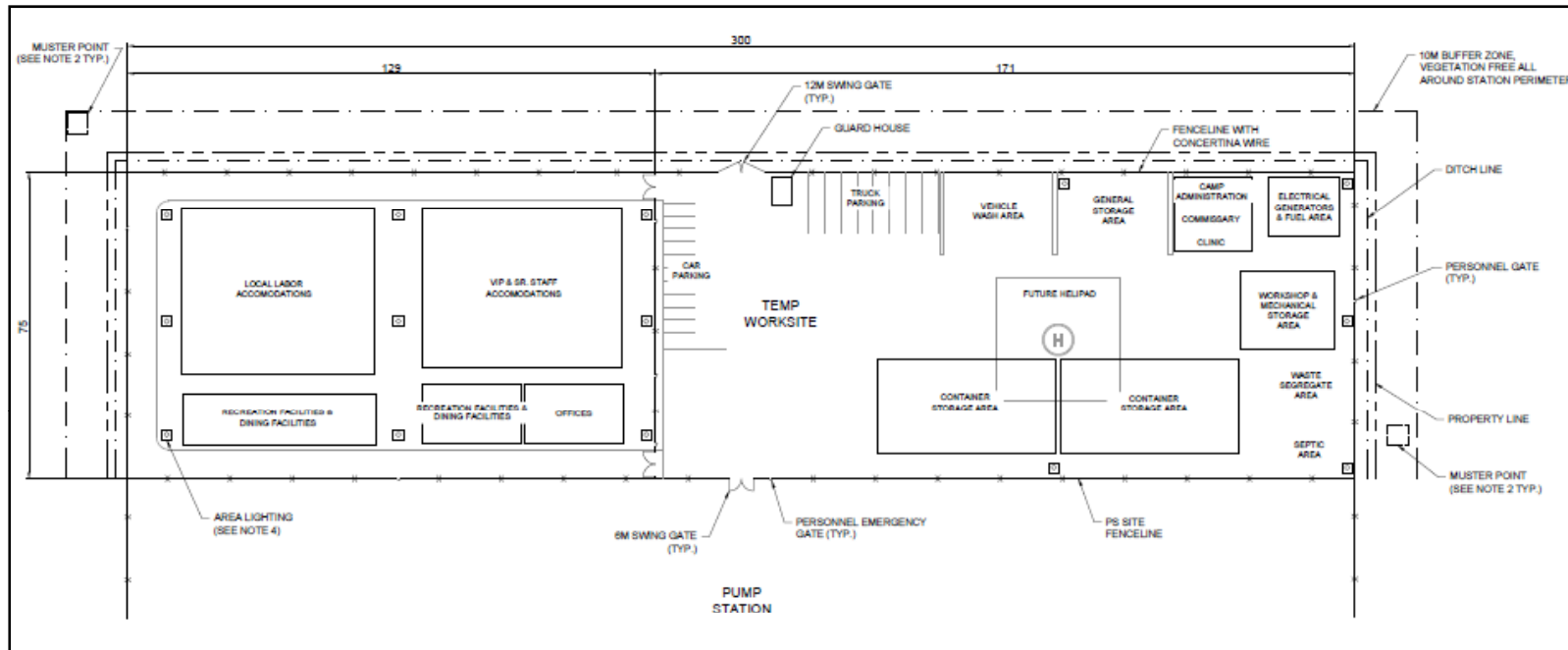
PIPELINE CONSTRUCTION CAMP LAYOUT



- Camps are intended to:
 - Accommodates up to 1,000
 - Self contained power generation & water treatment
 - Areas designated for housing, recreation & medical
 - Canteens specific for dietary restrictions
 - Offices for Contractor, EPcm and TEAM employees
 - Consumption of over 6000 liters per day of potable water
 - Warehouses for small tools, equipment, maintenance, consumables & PPE
 - Fabrication shops
 - Daily transports of workers to pipeline construction sites
 - Training & education centers for skill trades and testing centers
 - Daily food & fresh produce opportunity for local content



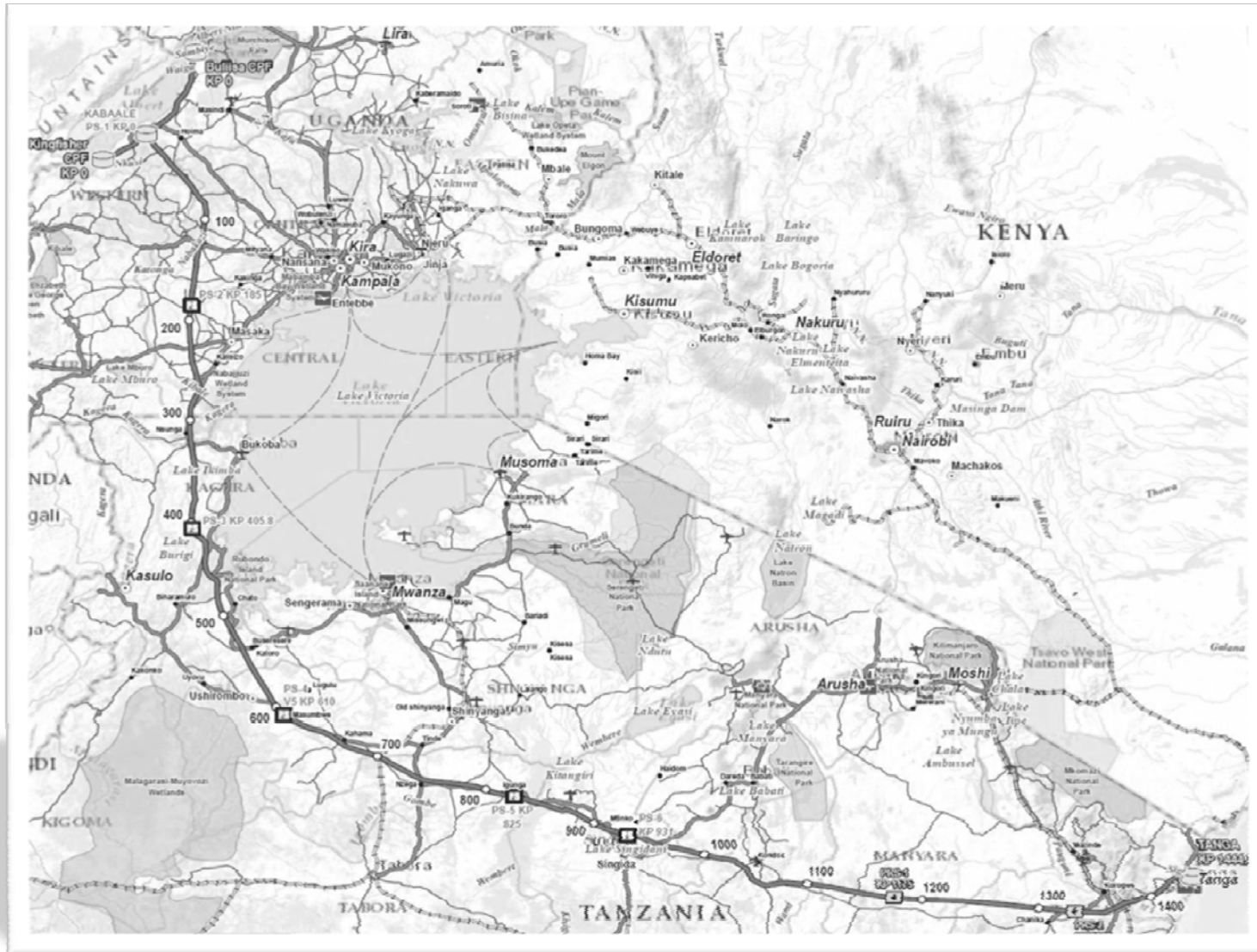
PUMP STATIONS 1 & 2 CONSTRUCTION CAMPS



- *Intended to accommodate up to 150 personnel*
- *Identical attributes as Pipeline Camps but scaled back due to phased construction and less material to stage*
- *Pump Stations 1 & 2 will have permanent roads built*
 - *Pump Station #1 road = 5.7km in length*
 - *Pump Station #2 road = 2.7km of existing road upgrade with 200m entry road*
 - *Roads will be part of Early Civil Works*



CODES AND STANDARDS REQUIREMENTS FOR THE EACOP MATERIAL, SERVICES AND CONSTRUCTION



CODES AND STANDARDS REQUIREMENTS;

UGANDA STATUTORY REQUIREMENTS

Uganda 1 - The Petroleum () Regulations, 2016
Uganda 2 - The Petroleum () (HSE) Regulations, 2016
Uganda 3 - The Petroleum () (National Content) Regulations, 2016
Uganda 4 - The National Oil and Gas Policy, 2008
Uganda 5 - The National Environment Act, Cap.153
Uganda 6 - The Roads Act, Cap 358
Uganda 7 - Access to Roads Act, Cap 350
Uganda 8 - The Water Act, Cap 152
Uganda 9 - The National Forestry and Tree Planting Act
Uganda 10 - Survey Act, Cap 232
Uganda 11 - The Occupational Safety and Health Act, 2006
Uganda 12 - The National Environment (Wetlands, River Banks and Lake Shores Management) Regulations, 2000
Uganda 13 - The National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations, 1999
Uganda 14 - The Water (Waste Discharge) Regulations, 1998
Uganda 15 - The National Environment (Noise Standards and Control) Regulations, 2003
Uganda 16 - The National Environment (Hilly and Mountainous Areas Management) Regulations, 2000
Uganda 17 - The National Environment (Minimum Standards for Management of Soil Quality) Regulations, 2001
Uganda 18 - NEMA Draft Air Quality Standards
Uganda 19 - Drinking (potable) water - Specification, 2008
Uganda 20 - NEMA Operational Waste Management Guidelines, 2012
Uganda 21 - EIA Regulations, 1998
Uganda 22 - Public Health Act, Cap 281
Uganda 23 - The National Environment (Waste Management) Regulations, 1999
Uganda 24 - The National Environment (Industrial and Consumer Chemicals Control) Regulations, draft 2014
Uganda 25 - The National Environment (Oil Spill Prevention, Control and Management) Regulations, draft 2014
Uganda 26 - The National Environment (Petroleum Waste Management) Regulations, draft 2014
Uganda 27 - NEMA EIA Guidelines for Energy Sector, 2004
Uganda 28 - The Uganda National Land Policy, 2011
Uganda 29 - NEMA Public Notice on Emission, 2006
Uganda 30 - The National Environment (Air Quality) Regulations, draft 2013
Uganda 31 - The National Environment (EIA) Regulations, draft 2014
Uganda 32 - The Petroleum (Upstream) Regulations, 2016
Uganda 33 - The Petroleum (Upstream) (National Content) Regulations, 2016
Uganda 34 - The Petroleum (Upstream) (Metering) Regulations, 2016

IFC GUIDELINES

IFC 1 - Policy on Environmental and Social Sustainability - 2012
IFC 2 - EHS General Guidelines - 2007
IFC 3 - EHS Guidelines for Onshore Oil and Gas Development - 2007
IFC 4 - EHS Guidelines for Crude Oil and Petroleum Product Terminals - 2007
IFC 5 - EHS Guidelines for Thermal Power Plant - 2008
IFC 6 - EHS Guidelines for Ports, Harbors and Terminals - 2007
IFC 7 - EHS Guidelines for Waste Management Facilities - 2007
IFC 8 - Workers Accommodation Processes and Standards - 2009
IFC 9 - Guidelines for Performance Standards - 2012



CODES AND STANDARDS REQUIREMENTS;

- International codes and standards related to equipment, material and construction, consisting of:

Standard	Title
American Petroleum Institute	
API 560	Fired Heaters
API 610	Centrifugal Pumps
API 650	Welded Tanks for Oil Storage
API 660	Shell and Tube Heat Exchangers
API 1104	Welding Pipelines and Related Facilities
API 6D	Pipeline Valves
API RP5L	Recommended Practice for Railroad Transportation of Line Pipe
API MPMS CH. 6.6	Metering Assemblies: Pipeline Metering Systems
American Society of Mechanical Engineers	
ASME B16.5	Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch
ASME B16.9	Factory Made Wrought Buttwelding Fittings
ASME B16.20	Metallic Gaskets for Pipe Flanges: Ring-Joint, Spiral-Wound, and Jacketed
ASME B16.34	Valves Flanged, Threaded and Welding End
ASME B16.49	Factory-Made, Wrought Steel, Buttwelding Induction Bends for Transportation and Distribution Systems
ASME B31.3	Process Piping
ASME B31.4	Pipeline Transportation Systems for Liquids and Slurries
ASME BPVC	Boiler & Pressure Vessel Code
ASTMA370	Standard Test Methods and Definitions for Mechanical Testing of Steel Products

Standard	Title
American Welding Society	
AWS D1.1 & 1.8	Structural Welding Code - Steel & Seismic Supplement
AWS A5	Carbon Steel Electrodes for Shielded Metal Arc Welding
British Standards Engineering	
BS EN 1337	Structural Bearings. Elastomeric Bearings
BS EN 1990	Basis of Structural Design
International Electrotechnical Commission	
IEC 60034	Rotating Electrical Machines
IEC 62271	High-Voltage Switchgear and Controlgear
IEC 61800	Adjustable Speed Electrical Power Drive Systems
IEC 60794	Optical Fibre Cables
International Organization for Standardization	
ISO 10816	Mechanical Vibration
ISO 8528	Reciprocating Internal Combustion Engine Driven Alternating Current Generating Sets
International Society of Automation	
ISA 5.4	Instrument Loop Diagrams
ISA 20	Instrument Specification
NFPA 37	National Fire Protection Association - Installation and Use of Stationary Combustion Engines and Gas Turbines
PRC1-PR-227-9424	Installation of Pipelines by Horizontal Directional Drilling
MSS SP-75	High-Test Wrought Butt Welding Fittings
CSA Z245.22-14	Canadian Standards - Plant-Applied External Coatings for Steel Pipe
DNV - OS-C201	Det Norske Veritas - Structural Design of Offshore Units (WSD Method)



CODES AND STANDARDS REQUIREMENTS;

- International codes and standards related to equipment, material and construction, consisting of:

Major Equipment & Materials	Primary Codes & Standards
Line Pipe	API RP 5L
Piping, Fittings, Flanges, and Valves	ASME B16.5, B16.20, B16.34, B31.3, B31.4, API STD 1104 Section 4.2.2.1.
Pig Receivers and Launchers: 24" X 30"	ASME B31.3, BPV Code Section VIII, Division 1
Export Crude Custody Transfer Meter	API MPMS Ch. 6.6, ISO 5168, ASTM A370 metal tensile test
Crude Oil Bulk Heat Exchangers – Shell and Tube, Hot Oil/Crude Oil	API STD 660
Direct Fired Hot Oil Heaters for Crude Oil Bulk Heating	API STD 560
Export Pumps	API STD 610
Power Generator Engine, Crude Oil Fueled, Continuous Duty Generator Package Including Fuel Treatment, Heat Exchangers, Intake/Exhaust System, Lube Oil System, Air Starters, Skids, Controls And Other Equipment Required For A Complete Package	IEC 60034, ISO 10816, ISO 8528, NFPA 37
Crude Oil Storage Tank	API STD 650
Step-Up Transformer	IEC 60076
Pad mounted Transformer	IEC 60076
MLBV	API 6D
High Voltage Switchgear	IEC 62271
High Voltage Variable Speed Drive	IEC 61800
LLHT In-Station Heat Tracing Controller	IEC 60947
LLHT Cable	IEC 60502
HV Cable	IEC 60502
Instrumentation – P, T, Flow	ISA 5.4, ISA 20
Telecommunication – Fiber Optic Cable	IEC 60794
Civil / Structural	BS EN 1337, BS EN 1990, DNV-OS-C201, AWS D1.1 and 1.8

Pipe, valves and fittings must have mill certificates for verification of compliance to metal and ratings.



CODES AND STANDARDS REQUIREMENTS

Pipeline Material	Applicable Code	Title
Pipe	API RP 5L	Specification for line pipe
Flanges	ASME B16.5	Pipe Flanges
	MSS SP-44	Steel Pipeline Flanges
Fittings	ASME B16.9	Factory made wrought steel butt welding fittings
	MSS SP-75	High test wrought butt welding fittings
HIB	ASME B16.49	Factory made wrought steel butt welding induction bends
Pipe Insulation coating	CSA Z245.22-14	External polyurethane foam insulation coating for steel pipe
Pipeline Construction	AWS A5 series of specifications in API ST	All welding consumables
	ASTM A370	metal tensile test
	UT-MID-60-0100-200003,	Installation onshore pipelines, OR
	API Std 1104	Welding of Pipelines & related facilities
	PRCI-PR-227-9424	Installation of pipelines by HDD
	ASME BPVC Section II Part C	Specifications for Welding Rods, Electrodes, and Filler Metals

Construction ETICB or Equivalent Qualifications	
Civil Works	Level 2/3 Machine Operation
	Level 2 Formwork Carpentry
	Level 2 Concrete Finishing
Electrical	Level 2/3 Electrical Installations
	Level 3 HV Electrical Installations
	Level 3 Instrument & Control
Scaffolding	Level 3 Scaffolding
Piping	Level 3 Pipe Welding plus ASME Piping 2G, 5G, 6G
	L3 Plate Welding Plus ASME Plate 3G, 4G
	L3 Pipe Fitting
	L3 NDT
Structural & Mechanical	L3 Mechanical Fitting
	L3 Steel Erecting
	L3 Rigging



QUALITY-HEALTH-SAFETY-ENVIRONMENTAL STANDARDS

- Service & Goods Suppliers will be required to meet Quality-Health-Safety-Environmental (QHSE) standards
 - **QHSE - ISO 9001 - Quality Management Systems**
 - ISO 9001 defines quality management by establishing criteria for quality management systems. The ISO 9001 criteria can be used by any type of organization, without regard to size. The objective is to ensure customers consistently receive products and services of good quality.
 - **QHSE - ISO 14001 - Environmental Management Systems**
 - ISO 14001 provides a framework for environmental management. By providing practical tools for identifying and controlling an organization's environmental impact, and for constantly improving environmental performance, ISO 14001 results in an effective environmental management system, with benefits of:
 - Protection of the quality of the environment
 - Reduced cost of waste management and disposal
 - Reduced consumption of energy and raw materials
 - Reduced distribution costs
 - Improved corporate image
 - **QHSE - OHSAS 18001 - Occupational Health and Safety Management Systems**
 - OHSAS 18001 uses the same approach as ISO 14001, but with the objectives of identifying safety and health hazards, reducing the potential for accidents, and creating a safe and healthy working environment. In addition, it provides guidelines for integrating the management of health and safety into the overall business management system. Some of the requirements of the OHSAS 18001 include:
 - Identifying health and safety risks, and associated legal requirements
 - Understanding the health and safety issues faced by employees, and their potential impacts
 - Establishing health and safety goals and targets
 - Creating a formal health and safety policy
 - Communicating the policy and its implementation to employees
 - Monitoring and auditing the activities that control health and safety risks

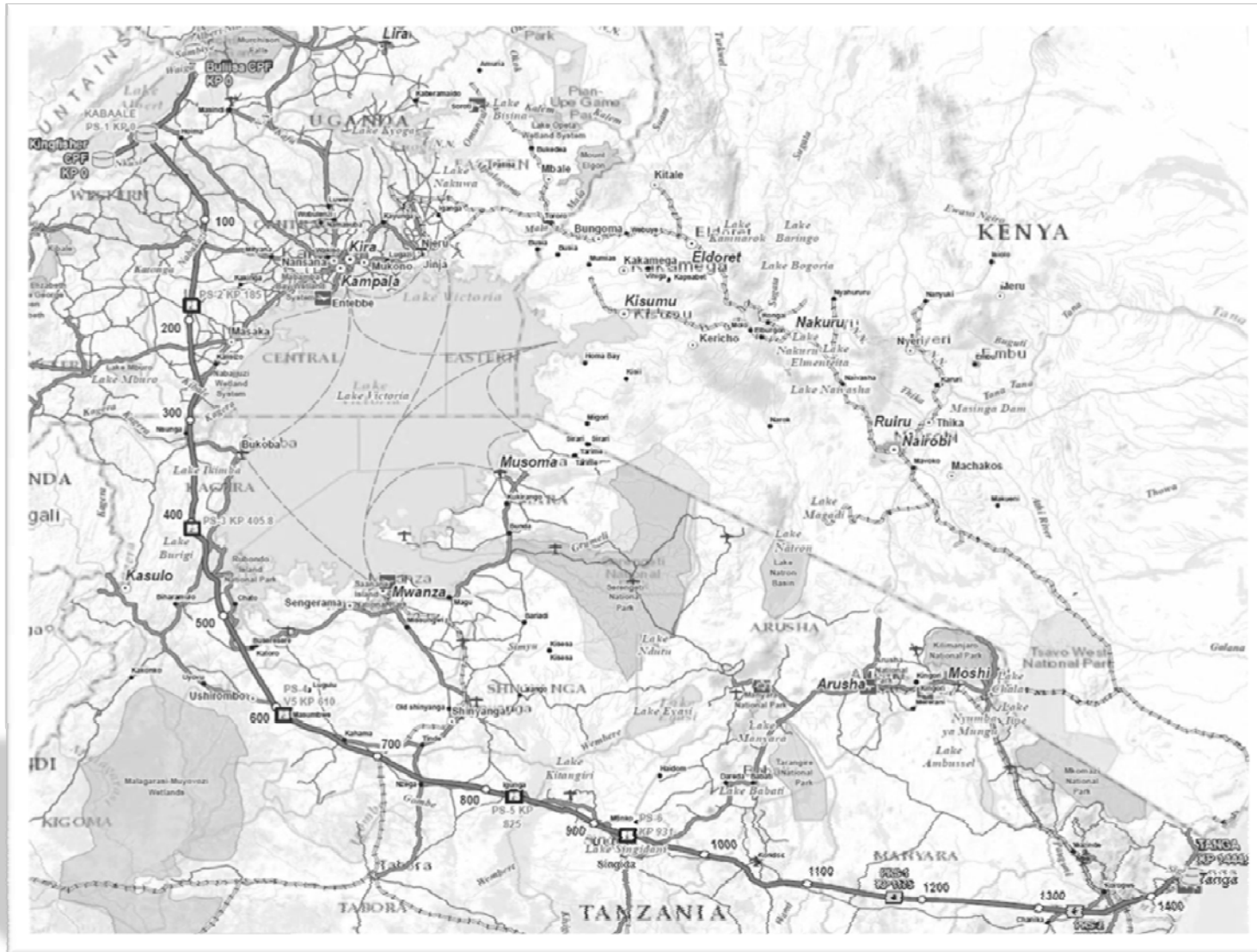


QHSE REQUIREMENTS PER SERVICES/GOODS

SERVICES/GOODS	QHSE STANDARDS	SERVICES/GOODS	QHSE STANDARDS
Backfill Soils and Excavated Soils Transport	14001, 18001	Civil Construction Works	14001, 18001
Civil Engineering Services	9001, 18001	Construction Camps Catering Services	14001, 18001
Construction Camps Medical Operations	14001, 18001	Construction Camps Operations	14001, 18001
Environmental Monitoring	9001, 14001, 18001	Helicopter and Fixed Wing Transport	14001, 18001
Fuel Supply & Depot Operations	14001, 18001	Heavy Lift Cranes & Operators	14001, 18001
International Freight Forwarding	9001, 14001	Lab Testing Soils, compaction, compression	9001, 18001
Logistic Services	9001, 14001	MEDIVAC Services	14001, 18001
OEM Vehicle Replacement Parts	9001	Vehicle Rentals, Operators & Drivers	14001, 18001
Portable Concrete Batch Plant	14001, 18001	Portable Generators Supply & Maintenance	14001, 18001
Portable Tarmac Unit	14001, 18001	Portable Water & Waste Water Treatment Units	9001, 14001, 18001
Road Boring Equipment	14001, 18001	Road Construction (Permanent & Temporary	9001, 14001, 18001
Road Maintenance and Repair	14001, 18001	Safety Inspectors	14001, 18001
Security (7/24)	18001	Shipping Containers and Crating	9001, 18001
Solid Waste Disposal	14001, 18001	Survey Services	9001, 18001
Temporary Warehousing	14001, 18001	Transport Vehicles - Material & Equipment	14001, 18001
Water Trucks (Dust Control)Services	14001, 18001	Water Well Services	14001, 18001



TIER 1 CONTRACTS SCOPE OF WORK



TIER 1 CONTRACTS

- EPcm Contract TIER 1:

- Advance the detailed engineering and design of the FEED design to Approved for Construction:

- Local hiring of engineering professionals for exchange of technology and operational aspects in preparation of construction and commissioning support;
 - Oversee Civil Surveys for ground proofing of approved Pipeline Right of Way, Pump Stations, Electrical Heat Trace Substations and Camps;
 - Preparation of Pipeline Alignment Sheets for epC Contractors;
 - Procure major engineered equipment and specialty materials – provide expediting and factory inspections for procured equipment/materials;
 - Interface with Logistics provider for scheduled deliveries of material & equipment;
 - Receiving inspections of major pre-engineered material and equipment upon arrival;
 - Organizing of pre-engineered material and equipment to respective warehouses and marshalling camps
 - Develop epC Construction Bid Documents for competitive pricing;
 - Support EACOP in bidding & award of epC Contracts.



TIER 1 CONTRACTS

- EPcm Contract:
 - Establish construction management and field inspection operations;
 - Provide training for field inspectors;
 - Pre-Construction Activities of epC Contractors;
 - Monitor establishment of construction camps;
 - Reporting of National Content Tiers 1,2,3..... subcontracting contents & values
 - Qualification testing of skilled labor (Welders, HV electrical, Operators, etc.)
 - Pipeline ROW survey staking
 - Out Reach meetings with local towns and participation w/ESHIA Consultant
 - Monitor and report all construction related activities and National Content Participation Status;
 - Assist in the commissioning of the Pipeline Systems;
 - Prepare As-built drawings and final Project Close-out.



TIER 1 CONTRACTS

- Pipeline epC Contract TIER 1:
 - Establish Construction Camps & Pipe Yard Marshalling Camps
 - Training for skilled trades (welding, HV Electrical, Operators, etc.)
 - Pre-Construction Surveys for ROW and Areas of Disturbance Staking
 - Clearing & Grubbing of Pipeline Right of Way
 - Stringing, Trenching,
 - Welding, Heat Trace Cabling Pulling, Field Coating, Testing and Commissioning Support
- Pump Stations epC Contract TIER 1:
 - Establish Construction Camps at each of the two locations
 - Civil Works for Pump Stations
 - Concrete & Compaction Testing subcontracts
 - Mechanical/Electrical/Instrumentation Construction
 - Pre-Commissioning & Commissioning Support
- Electrical-Instrumentation-Telecommunications Systems TIER 1;
 - Supply all engineered electrical, instrumentation & telecommunication equipment, materials and integrated systems
 - Provide installation monitoring and technical support
 - Commissioning of SCADA/ICS & Telecommunications Systems



TIER 1 CONTRACTS

- Early Civil Works Construction:
 - 2 Specific Contracts
 - #1 - Civil Surveys for access roads and temporary construction camp
 - #1 - Detailed Engineering for Temporary and Permanent Access Roads
 - #2 - Construction of Temporary & Permanent Access Road, clearing, leveling and grading of Temporary Construction Camps
- Early Civil Works will require final Civil Survey and Detailed Engineering for access roads listed in following table before bidding and commencement of construction.

Description	Purpose	Road Distance (M)
EXISTING ROAD UPGRADE	Tilenga FEEDER Line	2,078
NEW PERMANENT ACCESS ROAD	Pump Station 1 (PS1)	5,711
NEW TEMPORARY ACCESS ROAD	MCPY 1	558
NEW TEMPORARY ACCESS ROAD	MPCY 2	560
EXISTING ROAD UPGRADE	MCPY 2	1,456
NEW PERMANENT ACCESS ROAD	Pump Station 2 (PS2)	177
EXISTING ROAD UPGRADE	To New PS2 Permanent Road	991
EXISTING ROAD UPGRADE	To New PS2 Permanent Road	1,710
NEW TEMPORARY ACCESS ROAD	MCPY 3	738
NEW TEMPORARY ACCESS ROAD	MPCY 3	2,008



TIER 1 CONTRACTS

- Logistics & Inland Transportation TIER 1:

- Primary Scope of Work

- Freight Forwarder for engineered equipment and materials delivery from international OEM locations to the Tanzania Port of Call
 - Customs Clearance of received equipment and materials
 - Temporary Staging prior to transport
 - Inland Transportation of pipe, cabling, equipment and materials to strategic marshalling yards

- Summary of Uganda Related Scopes of Work

- Transport of 32,600 joints of 12M insulated line pipe during 14 month period
 - Transport of 391 (1KM) spools of 33 kVA Cabling
 - Transport of 391 (8KM) spools of Fiber Optic Cabling
 - Transport of 1,173 (1KM) spools of Heat Tracing Cables
 - Transport of eight (8) Crude Oil Pumps (16.2 MTN each)
 - Transport of three (3) power generation units Pump Station #2– (52MTN each)
 - Transport of 733 MT (4318 CM) of mechanical and electrical engineered equipment
 - Transport of 5 pre-fabricated Electrical Heat Trace Substation Modules (5m x 3m)



TYPES OF TRANSPORTS REQUIRED



Multiple axle trailers for transport of:

Three (3) Power Generation Units
One (1) direct fired heater + 2 heat exchangers per Pump Station

Tractor & Trailer for 32,600 - 12M line pipe joints over 14 months

- 12 joints bare pipe per truck 194 truck loads per month
- 6 joints insulated pipe per truck 398 truck loads per month



TYPES OF TRANSPORTS REQUIRED



Standard 12m Container

- Minimum 150 per pump station for pre-engineered material/equipment
- When emptied, must be returned to port of call
- Contractors potential double quantity for their equipment

Heat Trace, Fiber Optic & HV Power Cabling

- 1,403 spools @ 1km each of Heat Trace & HV Cabling
- 43 spools @ 8km each of fiber optic cabling
- 2 spools per truck load
- Empty spools must be returned after cable installed



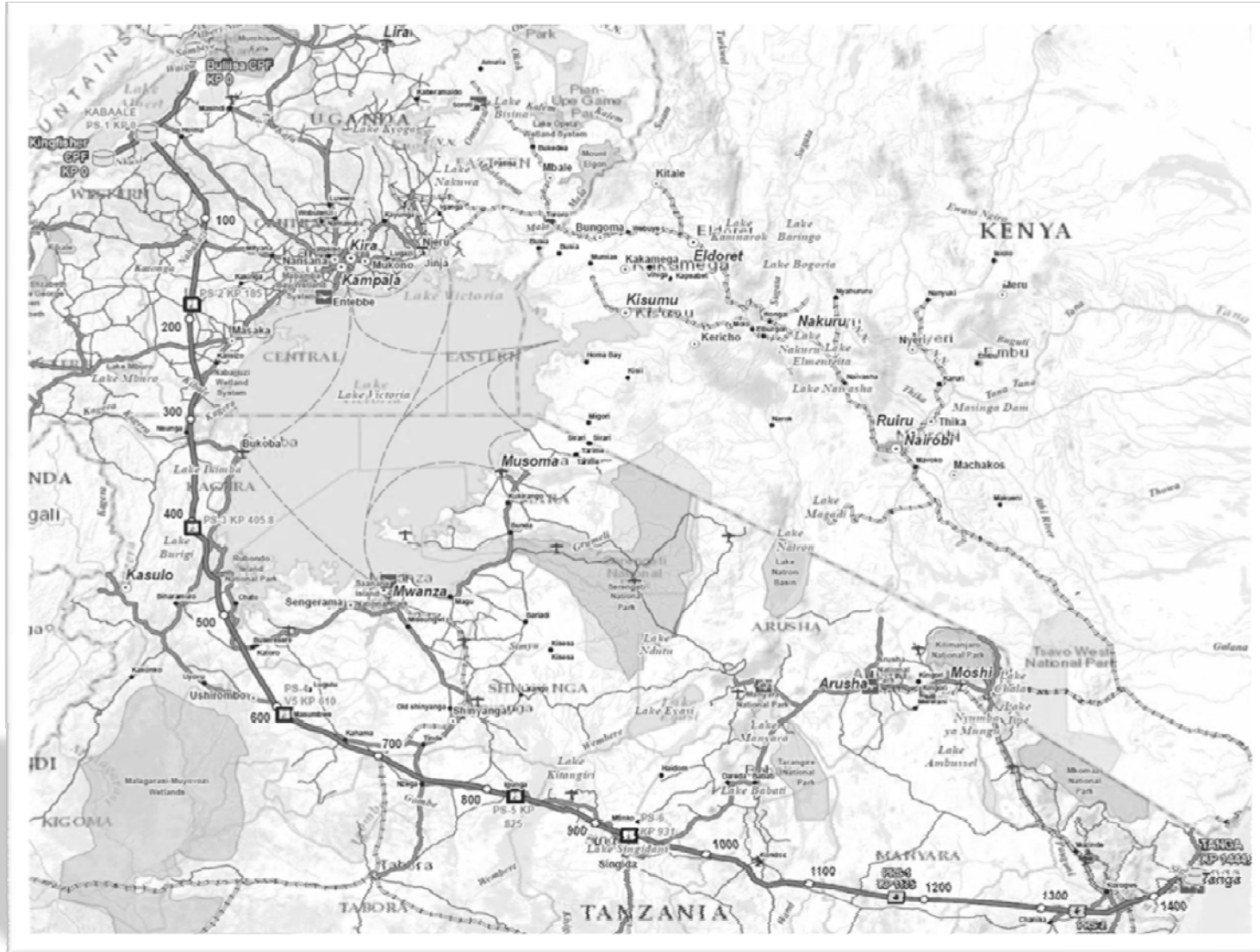
PIPELINE CONSTRUCTION MAJOR EQUIPMENT



PIPELINE EQUIPMENT	Quantity
Access Road 2 Crews	
Backhoe Loader 416C /428C	2.00
Dozer D9 Cat	2.00
Grader 160 H	4.00
Loader 966	2.00
Silindir 323/Bomag 213 PHD-2	2.00
Low bed 80 + 6x4 trailer	2.00
Kamyon 6X6 + damper	10.00
Tanker 10t	4.00
ROW 2 Crew	
Dozer D9 Cat	2.00
Grader 160 H	4.00
Silindir 323/Bomag 213 PHD-2	2.00
Loader 966	2.00
Bckhoe Loader 416C /428C	2.00
Low bed 80 + 6x4 trailer	2.00
Tanker 10t	4.00
Stringing 1 Crew	
Hi-ab 6x6	2.00
6x4 Trailer & flat-Bed	10.00
Sideboom 583	3.00
Welding 1 Crew	
Paywelder 953D	6.00
Hi-ab 6x6	2.00
Sideboom 583	2.00
Tie-in 4 Crews	
Çadırılı Hi-ab 6x6	4.00
Hi-ab 6x6	4.00
Sideboom 583	4.00
Coating 1 Crew	0.00
Hi-ab 6x6	3.00
Dirch 1 Crew	0.00
Cat 345	10.00
Hi-ab 6x6	1.00
Lowering-in 1 Crew	0.00
Sideboom 583	8.00
Hi-ab 6x6	2.00
Dozer D9 Cat	1.00
Loader 966	1.00
Hydrotest 1 Crew	0.00
Hi-ab 6x6	2.00



SERVICES AND SUPPORT REQUIRED DURING THE CONSTRUCTION PHASE OF THE PROJECT



SERVICES AND SUPPORT REQUIRED DURING THE CONSTRUCTION PHASE OF THE PROJECT

ESTIMATE OF QUANTITIES

Civil Works	Unit	Quantity
Pipeline ROW Clearing	CM	782,000
Pipeline Trenching	CM	703,800
AGI Site Grading & Backfill	CM	105,000
Pump Station 1 Foundation Excavations	CM	475,786
Pump Station 2 Foundation Excavations	CM	536,910
Construction Camps	CM	30,889
Access Roads	CM	16,316
TOTAL EARTH WORKS	CM	2,650,701

Pipe, Valves & Fittings	Unit	Quantity
Pump Station 1 Piping	M	1,858
Pump Station 1 Valves & Fittings	EA	729
Pump Station 2 Piping	M	1,538
Pump Station 2 Valves & Fittings	EA	620
Pipeline 24"	M	391,000
Pipeline Main Line Block Valves	EA	24
TOTAL PIPING	M	394,396
TOTAL VALVES & FITTINGS	EA	1,373

Foundations	Unit	Quantity
Pump Station 1	CM	15,101
Pump Station 2	CM	21,733
MLBV Vaults	CM	115
Heat Trace Substations	CM	21
TOTAL FOUNDATIONS	CM	36,969

Electrical Cabling	Unit	Quantity
Pump Station 1	M	900
Pump Station 2	M	1,044
Heat Trace Cables	M	1,173,000
HV Cables	M	391,000
Fiber Optic Cabling	M	391,000
TOTAL CABLING	M	1,565,944



SERVICES AND SUPPORT REQUIRED DURING THE CONSTRUCTION PHASE OF THE PROJECT

INDICATIVE MATERIALS & EQUIPMENT LISTING

In Country Materials
Aggregate
Bulk Cement
Concrete Batch Plants
Concrete Blocks Fence & Bricks
Concrete Delivery Trucks
Construction Camp Furnishings
Construction Camp Canteen Equipment
Construction Camp Catering Services
Construction Camp Temporary Fencing
Construction Equipment Fuel
Construction Equipment Spare Parts
Cranes for AGI Heavy Lifts >40t
Cranes for AGI & Pipeline Equipment <30t
Dragline Mats
Engineered Backfill Soils
Fencing (Pipeline MLBV & EHT Substations)
Fencing Concrete

In Country Materials
Fencing Wrought Iron
Foundation Re-Steel
Geotextile Materials
Lumber - Temporary Formwork
Lumber - Permanent Buildings
Murram Materials
Office Supplies & Furnishings
Pipe Spool Fabrication
Pipe Supports
PPE Equipment (Safety Glasses, Rain Gear, Hard Hats)
Portable Power Generators
Portable Pumps & Lighting Units
Signage
Small Tools
Structural Steel (Ladders, Grating, Pipe Racks)
Tarmac Asphalt
Temporary Storm Water runoff (Erosion Control) Tiles
Hay, Silt Fence, Sediment Logs, Erosion control matting
Temporary Warehousing



SERVICES AND SUPPORT REQUIRED DURING THE CONSTRUCTION PHASE OF THE PROJECT

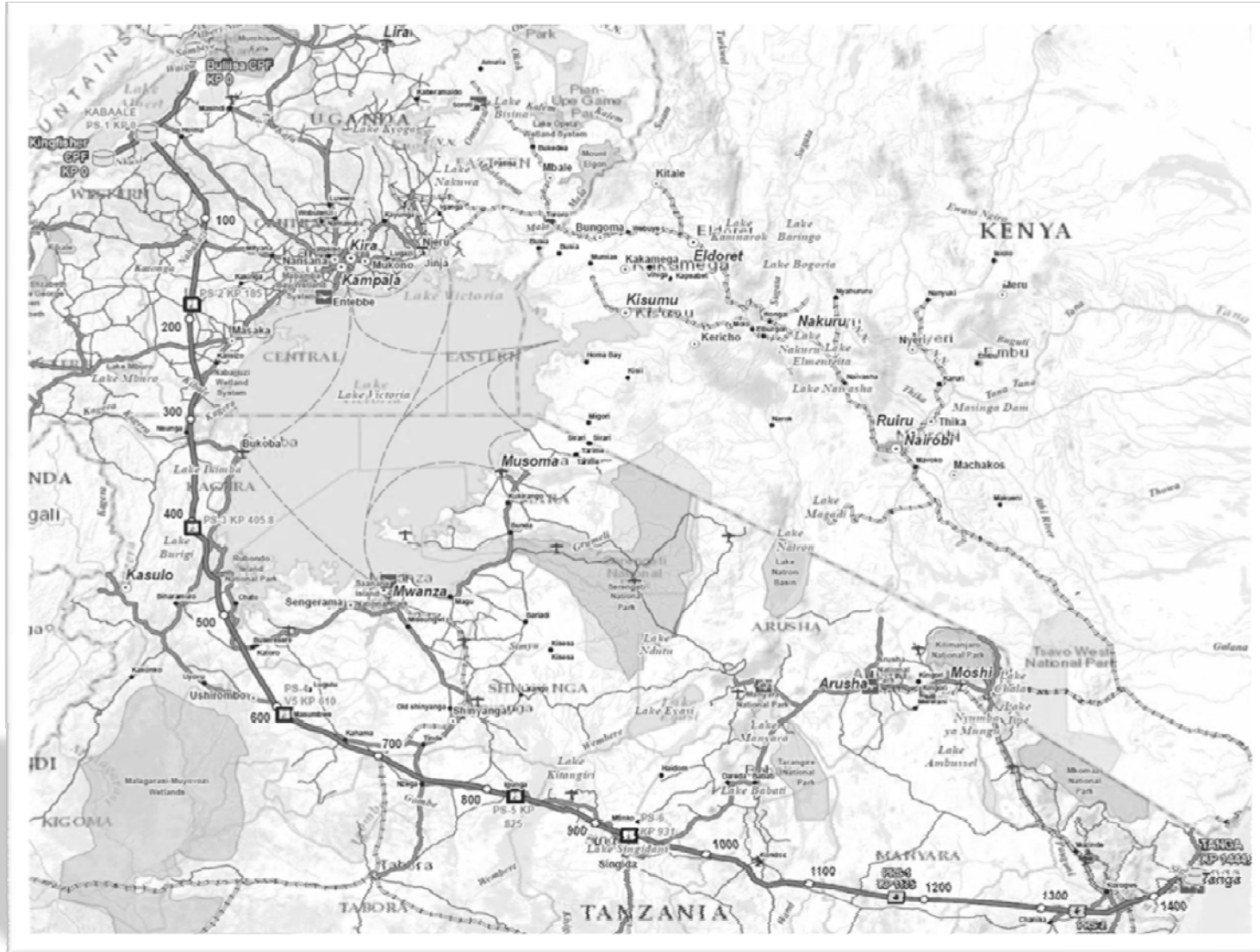
INDICATIVE SERVICES REQUIRED LISTING

In Country Services
AGI Construction Labor
ATV Rentals
Catering Supply & Delivery Services
Civil Engineering
Civil Works (Grading, Levelling, Spoils Removal)
Construction Camps Maintenance Support
Construction Camps Administrative Personnel
Construction Camp Food Preparation Personnel
Construction Camp Medical Personnel
Crew Personnel Transport (Buses)
Customs Clearance
Environmental Monitoring
Equipment Specialty Mechanics
Equipment Maintenance
Equipment Operators
Escort Vehicle Services
Field Engineers (ME, CE, IE, EE)
Field Inspectors (welding, electrical, civil, etc)
Foundations Labor (Rodbusters, Formwork, Concrete)
Helicopter and Fixed Wing
In Country Equipment Rentals
International Freight Forwarding
Lab Testing Soils, compaction, compression
Logistic Services

In Country Services
Masons
MEDIVAC
Pipeline Labor
Portable Generators Maintenance
Portable Tarmac Unit
Portable Water & Waste Water Treatment Units
Road Boring
Road Construction
Road Flagmen
Road Maintenance and Repair
Safety Inspectors
Security (7/24)
Shipping Containers and Crating
Soils and Ash fault Transport
Survey Crews
Tanks (<50kcm) Plate Welders
Temporary Office Personnel
Transport Vehicles
Vehicle Parts
Vehicle Rentals
Waste Disposal
Water Trucks (Dust Control)
Water Well Services
Welder Qualification



TYPE OF LABOR REQUIREMENTS



TYPE OF LABOR REQUIREMENTS

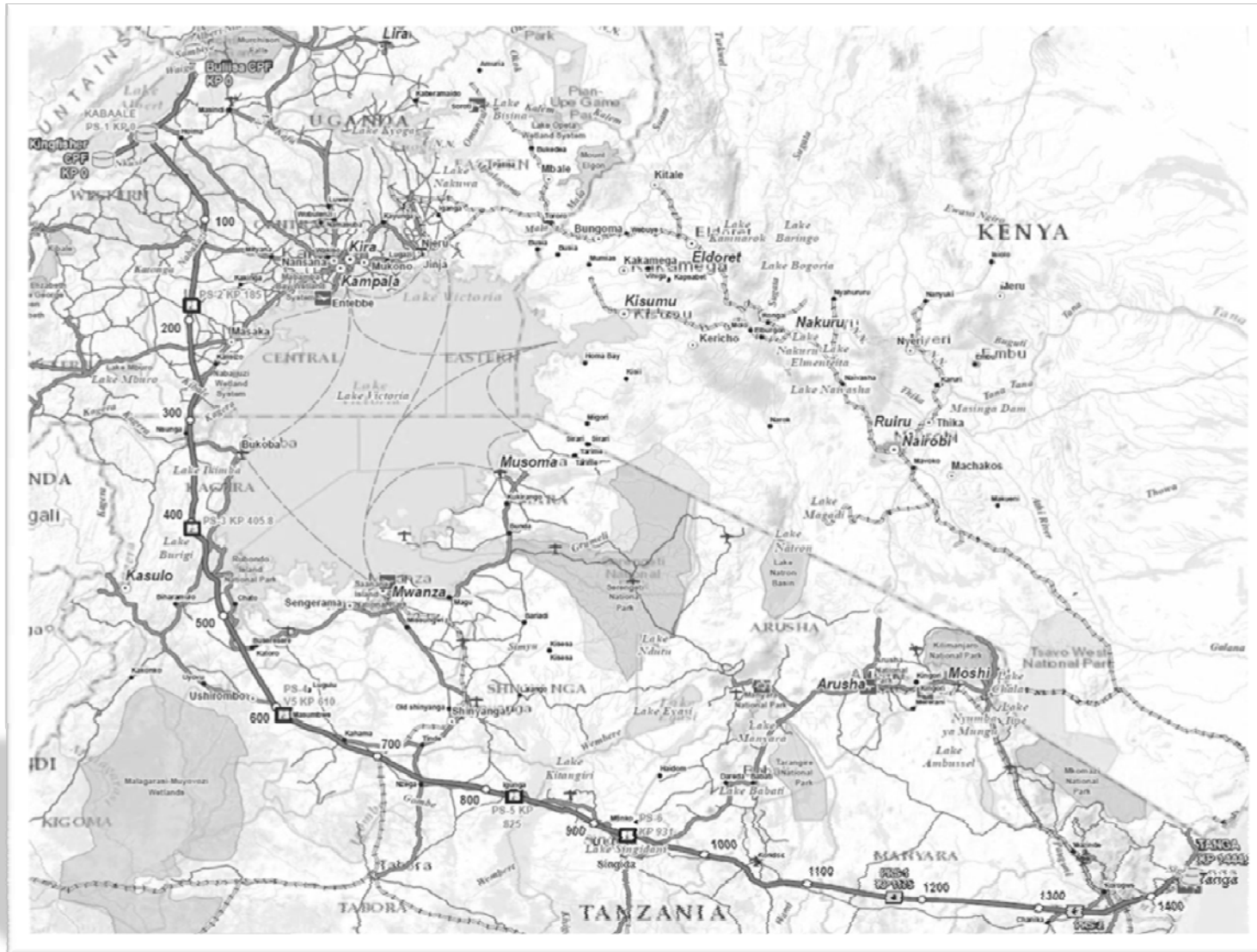
CONSTRUCTION (epC)
Accept PUF Pipe at Yard
Access Roads (Along ROW)
Aerial Markers Install/Maintain
Backfill
Bend & Set-up
Camp Moves
Civil Works (MLV/LLLHT FDNS)
Cleanup
Dewatering Ponds
Ditch
Electrical/Instrumentation
Equip. Rig-Up
Fabrication
Field Joints
Haul & String Pipe
Haul Perm. Mat'ls.
Heat Trace Cable Pulling
HV Cable Install (In Trench)
Hydrostatic Test
K. P. Markers Install/Maintain
Lower-In
Mainline Valves
Maint. & Service
Move In/Out (Inland Transport)
Pipe Laying
Right-of-Way Grade
Set up Mob/Demob Equip
Tie-In
Warning Signs Install/Maintain
Welding Support

GENERAL FIELD SUPPORT (epC)
As-Built Survey
Camp Operational Support
Camp Set-Up & Support
Catering
Environmental Compliance/Inspections
Field Warehouse
PM SUPPORT
Precommissioning
Project Office
QA/QC
Supervision & Admin.
Survey
X-Ray (or UAT)

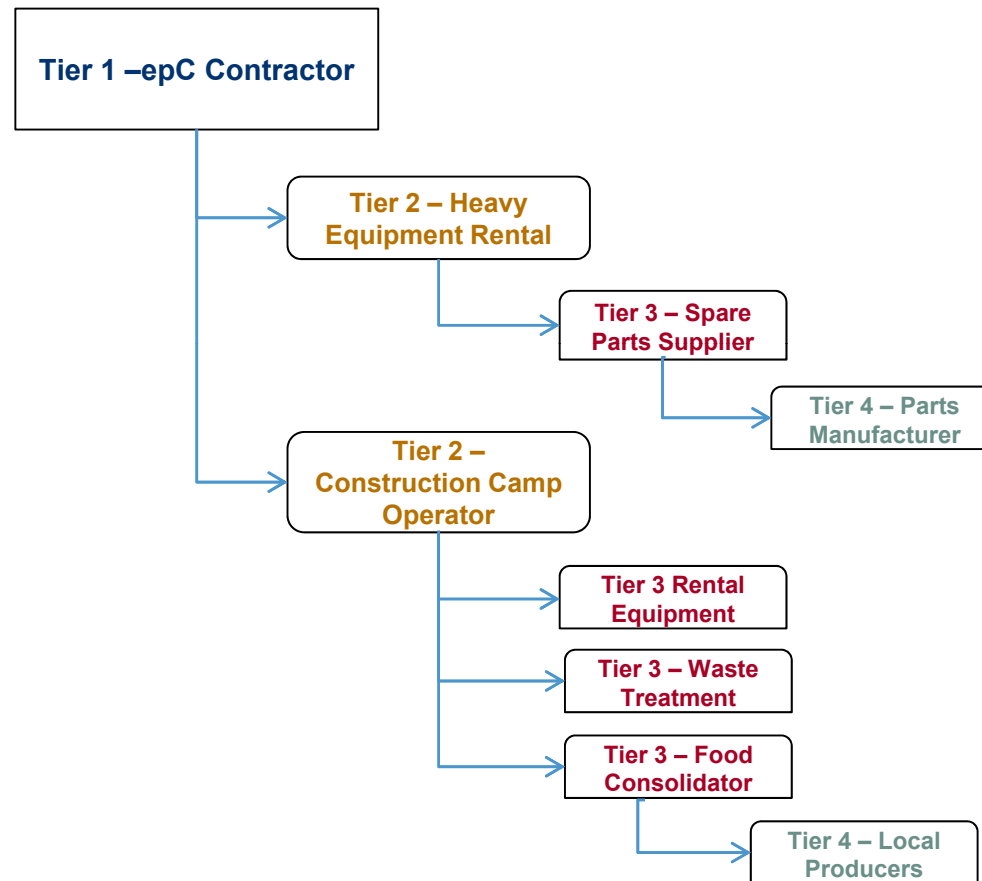
Pipeline Construction is more than welding line pipe together, testing and putting it in the ground. A significant amount of workers are required to prepare the ROW, transfer material and equipment, support the operations and keep the camps operating. Conclusion of construction involves restoration of AWS and ROW.



TIER 1,2,3 STRUCTURE FOR SERVICE PROVIDERS EXAMPLE



TIER 1,2,3,4 STRUCTURE FOR SERVICE PROVIDERS AND EXAMPLES



This is a detailed black and white map of East Africa, covering Kenya, Uganda, Tanzania, and parts of Rwanda and Burundi. The map shows major cities, roads, rivers, and lakes. Key features include:

- Kenya:** Major cities like Nairobi, Mombasa, Eldoret, and Kisumu are marked. The Great Rift Valley is visible, along with Lake Victoria, Lake Tanganyika, and Lake Malawi.
- Uganda:** Major cities like Kampala, Jinja, and Entebbe are shown. Lake Victoria is a prominent feature.
- Tanzania:** Major cities like Dar es Salaam, Arusha, and Mwanza are marked. Lake Tanganyika and Lake Malawi are prominent.
- Rivers:** The Nile River system is shown flowing through the region.
- Geographical Features:** The Great Rift Valley, Lake Victoria, Lake Tanganyika, Lake Malawi, and Lake Naivasha are clearly labeled.
- Infrastructure:** Major roads and highways are indicated by thick lines, and smaller roads by thinner lines.

LOCAL UGANDA COMMUNITIES IN CLOSE PROXIMITY OF THE EACOP PERMANENT INSTALLATION.

The EACOP Pipeline Route will be constructed near villages, towns and cities. Local communities will have the opportunities to be involved with the supply of goods and services referred to as “local content” based on meeting mandatory standards.

In certain areas temporary and permanent facilities will be constructed in support of construction and eventual operations.

Description	Nearest City	Approx. KM to City
Staging Yard for Tilenga FEEDER Pipeline	Biso	15
Main Camp Pipe Yard #1	Nyarweyo	10
Pump Station 1	Hoima	35
Main Camp Pipe Yard #2	Kyenda	10
Pump Station 2	Sembabule	10
Main Camp Pipe Yard #3	Raki	20



EACOP PROJECT

