Draft Due Diligence Report

Lake Victoria Transport PPP Due Diligence

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Works and Transport MINISTRY

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Preface

In October of 2016, the World Bank Group (WBG) and Maritime & Transport Business Solutions (MTBS / the Consultant) signed the Contract for the provision of Consultancy Services towards the development of a Due Diligence Study concerning Private Sector Participation in the Lake Victoria Transport Program (selection # 1218163).

The primary objective of the assignment, as articulated in the Terms of Reference (ToR), is to undertake the necessary due diligence to confirm relevance of progressing to the transaction stage and, when confirmed, to recommend on the alternatives and best option for a potential transaction for the involvement of the private sector in each one of the three following areas (the "Three Areas"):

- The operation of freight and passenger vessels on Lake Victoria on point to point services between ports across the Lake ("Influence Area A").
- The development and operation of stage passenger and ferry services, and required landing sites, on scheduled services to connect the islands to the mainland within Uganda, on routes currently operated by MoWT or not serviced ("Influence Area B").
- The operation of the inland ports of Port Bell and Jinja in Uganda, under a 'landlord' arrangement ("Influence Area C").

These three areas are shortly elaborated on in Appendix I. Furthermore, the report is structured as follows:

- Section 1 provides a contextual framework for the assignment, outlining the current situation and any identified developments of the overall EAC transport system and specifically for the Lake Victoria transport system.
- Section 2 provides a discussion of Uganda's trade profile and further details commodity groups that provide opportunities for Lake Victoria transport.
- Section 3 comprises demand forecasts for both cargo (Influence Area A and C) and passenger (Influence Area B) flows on Lake Victoria.
- Section 4 identifies and assesses potential technical implementation options for each of the Influence Areas, in line with the traffic projections. Following selection of preferred implementation options, cost estimates and further technical elaborations are provided.
- Section 5 comprises a tariff benchmark, which is aimed at identifying feasible and optimal tariffs for the Lake Victoria cargo and passenger projects outlined in earlier sections.
- Section 6 comprises an initial Environmental and Social Impact Assessment (ESIA), which is aimed at identifying key environmental and social risks concerned with the development projects outlined in earlier sections.
- Section 7 covers a Legal Due Diligence, consisting of a review of (i) the relevant legal framework for implementing the envisioned projects; (ii) Uganda's general experience with implementing PPP projects; and (iii) contracts of current operational ferry PPP projects in Uganda.
- Section 8 comprises the project-level business case, assessing the project-level feasibility and bankability of the envisioned projects for each of the three influence areas. Assessment of the feasibility and bankability is based on financial metrics such as a Net Present Value (NPV), Internal Rate of Return (IRR), and payback period.
- Following the project business case, the economic performance of the envisioned projects is assessed and presented in section 9.
- Section 10 comprises an elaboration of potential Public-Private Partnership (PPP) structures for each of the three influence areas. From the identified options, a preferred PPP option is subsequently selected for each of the influence areas.
- Based on the PPP structures selected in Section 10, Section 11 presents a Value for Money (VfM) analysis. The VfM compares the financial performance of the project as implemented through a PPP structure or through traditional public procurement (Public Sector Comparator).
- Section 12 comprises a high-level implementation plan for the identified projects, providing an overview of steps that need to be taken, key stakeholders of each of the steps, milestones, timelines, and potential risks.

In order to harmonize the report structure with the activities as outlined in the ToR, a matching matrix is provided below.

ToR Number	Item	Report Section
Technical DD		
(i) a	Market sounding – past experience	1.5; 6.3
(i) b	Market sounding – Willingness of local / international firms to invest	Part of market sounding report
(i) c	Market sounding – Identification of existing operators	1.5
(ii) a	Traffic & Demand Study – Review of existing throughput data and models	3.1; 2.3
(ii)b	Traffic & Demand Study – Surveys / RSI	3.2
(ii)c	Traffic & Demand Study – Tariff Benchmark	5.2; 5.3
(ii)d	Traffic & Demand Study – Base-year Mode Choice Model	3.1
(ii)e	Traffic & Demand Study – Long term traffic passenger & cargo demand forecast	3.1; 3.2
(ii)f	Traffic & Demand Study – Type & number of vessels to be used	4.1
(ii)g	Traffic & Demand Study – Tariff Structure	5.2; 5.3
(iii)a	Infra / Equipment – Development options	4.2
(iii)b	Infra / Equipment – navigational aids and port craft	4.2
(iii)c	Infra / Equipment – port backup area	4.2
(iii)d	Infra / Equipment – submerged breakwaters	4.2
(iii)e	Infra / Equipment – firefighting / sanitary arrangements / water / waste	4.2
(iii)f	Infra / Equipment – review of Port Bell / Jinja development plans	4.2
(iii)g	Infra / Equipment – landing site identification	3.2; 4.2
(iii)h	Infra / Equipment – CAPEX / OPEX	4.2
(iv)a	Initial Environmental, Social & Climate Change Assessment – ESIA	6; Appendix VII
(iv)b	Initial Environmental, Social & Climate Change Assessment – Climate Resilience Study	6; Appendix VII
(v)	Ferry Operations Management KPIs	7.5
(vi)	Preferred Approach and PPP Options	10
(vii)	Timeline / Phasing of Developments (+ identification of required studies)	12
Financial DD		
F1	Financial Assumptions	8; 9; 11
F2	ESCBA	9
F3	Risk Matrix	12
F4	VfM	11
Legal DD		
L1	Assessment of current laws, acts, and regulations	7.1
L2	Assessment of special privileges and incentives available to the PPP projects	7.1
L3	Recommendations regarding the legal / institutional / regulatory framework	7.1; 7.4
L4	Confirmation of the ownership of the land by the public authority	4.2; 6; Appendix VII
L5	Review of existing ferry contracts	7.3
L6	Identification of issues / challenges to implementation of selected PPP option	7.4

PART A: NEEDS ASSESSMENT

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1 Project Context

Summary

The following key Lake Victoria transport issues have been identified:

- Poor access infrastructure to the lake ports - Port Bell and the port of Jinja are connected to the Mombasa – Kampala main railway line (meter gauge). The port of Kisumu is also connected to this line, albeit through a branch line. However, all three of the rail connections are currently not functioning, as the rail and lake services were deemed uneconomic by the private concessionaire RVR, and were thus halted. Subsequently, encroachment issues arose as people started building houses on the derelict rail line. On the southern side of the lake, the port of Mwanza South is connected to the central corridor meter gauge rail network. Musoma port has no railway connection, but there is a railway track within the yard area to load/offload and shunt rail wagons. The other ports are only accessible by roads, which are typically in a poor condition.
- Competition from improved accessibility of the towns around the lake is undermining the transport services on the lake - The road network around Lake Victoria has gradually developed, through capacity and quality improvements of the highways and the introduction of more efficient One Stop Border Posts (OSBPs). The continuous improvement of the roads has reduced the competitive position of the transport services on the Lake on some routes. Additionally, the SGR projects in Kenya may further undermine the competitiveness of lake transport in the long term, as the SGR will provide a direct rail connection between the port of Mombasa and Kampala.
- Regular services are required at all ports to ensure accessibility - Sedimentation in the lake results in a periodic need for regular dredging at nearly all ports on the lake. Additionally, water-hyacinth and "floating islands" periodically clog up the ports, hampering the movement of vessels in and out of the ports. The figure below presents a time-lapse of the water hyacinth in the Kavirondo Gulf (Kisumu) between 2000 and 2013, where the water hyacinth issues are most severe.
- Adequate infrastructure and equipment are not available or dilapidated - None of the ports on Lake Victoria has container handling equipment. Generally, the existing port infrastructure is outdated and in poor condition, as the breakup of the EARHC in 1977 resulted in a decline in investments in infrastructure. Additionally, as adequate cargo handling equipment is lacking in the ports, all handling operations are carried out through manual labour, for which day labourers are hired directly by the vessel owner or cargo owner.
- Lake navigability and maritime safety are not yet sufficiently addressed - While all registered ships on Lake Victoria are provided with radio communication systems, none of the lake ports is provided with formally structured maritime assistance services of any kind. This implies that no general weather synopsis, storm or other navigational warnings are given to ships departing from any of the lake ports. The Lake Victoria Basin Commission Secretariat, in partnership with the EAC Partner states, is planning a Maritime Rescue Coordination Centre in Mwanza North, funded by the African Development Bank. The plots have been already acquired. Aids to navigation were installed and surveys have been made at the ports of Mwanza, Kisumu and Port Bell, though navigational charts are not publicly available. Besides the lack of the marine assistance services, the lake lacks landfall lights, beacons, buoys, leading lines or other facilities that delineate headlands, ship routes, known dangers (including wrecks) or the fairways and approaches to ports.
- Global best practice systems are not perfectly imitable on Lake Victoria - Similar areas include the coastal waters of the Baltic, Adriatic, and Aegean seas. These areas all envelop a multitude of islands, thus resulting in the need for short to medium range passenger and cargo ferry systems, similar to the Lake Victoria case. However, as Lake Victoria is not directly accessible from the Sea, importing vessels poses an issue. Additionally, the lake ports lack large shipbuilding facilities, thus limiting the size of vessels that can be constructed at the ports; it is noted that the Chinese firm Mango Tree Group has developed a large shipbuilding facility at a site in Kawuku (Wakiso district), therewith counteracting the construction limitations on Lake Victoria. However, due to a lack of specialised shipbuilding capabilities, high-end vessels still need to be constructed abroad. Vessels can subsequently be disassembled and transported to Lake Victoria, where they can be reassembled; this elaborate process results in increased costs of introducing new vessels, thus negatively impacting viability of projects. These challenges limit the imitability of implemented network solutions of otherwise similar cases.
- Need for an integrated and harmonious lake transport development plan - It is imperative that development plans are carried out at the lake level. As the lake presents a closed transport system, developments in one port will need to be implemented in parallel to similar developments in the other lake ports to become successful. Additionally, there should be a focus on key projects; introduction of new competing large-scale port projects, such as Bukasa port, may reduce the viability of the development of the current ports. Hence, such projects may substantially reduce private sector appetite for becoming involved in developing the current ports.
- Domestic passenger traffic - The passenger and vehicle transport between the islands and the mainland requires a proper solution. There are over 200 landing sites, which are mainly used for fishing and market activities. These sites require a safe and healthy set-up. In

order to serve the passenger flows between the islands and the mainland, roro facilities and ferry services should be introduced on several strategic high-volume routes.

In order to counteract these key issues, several developments are ongoing and planned. The following main Lake Victoria infrastructure, cargo transport, and passenger transport developments have been identified:

Infrastructure (section 1.5.2)

- Lake Victoria Transport Program – Under the Lake Victoria Transport Program, which is to be (partially) funded by the World Bank and the European Union, rehabilitation and improvement works are scheduled on all the major lake ports and their connecting infrastructure. Additionally, technical assistance towards implementation of lake safety and navigability measures is included in the program.
- Bukasa Port (Uganda) – The Bukasa port project comprises the development of a new port in Kampala, near the existing Port Bell. The port project is partially funded by the Government of Germany and is currently in the preliminary design phase, for which a consultant has been procured. Additionally, a high level financial and economic assessment has been completed. The port development is aimed at enabling accommodation of the expected future cargo volumes on Lake Victoria. The port is to be developed in two phases; the first phase will provide an annual cargo capacity of 2.3 million tons, whereas the second phase will add an annual capacity of 5.2 million tons. While it seems that a draft preliminary design has been completed, such a design has not been made available to MTBS for the purpose of this study.
- Lukaya Port (Uganda) – During stakeholder consultations, the Chinese owned Mango Tree Group presented plans for a port development at Lukaya, approximately 100 km southwest of Port Bell. The rationale behind this location is twofold; its location near an arterial road and outside of the congestion of Kampala enables efficient transport activities to the port's hinterland and its location is well suited to serve mines in Western Uganda. The plans for the Lukaya port include a 40,000 oil depot that can be used for Uganda oil reserves, a dry bulk cargo terminal aimed at handling iron ore and copper ore from mines in Western regions of Uganda, and the development of an industrial zone adjacent to the port.
- Kisumu SGR Port (Kenya) – While the current Kisumu port has been formally transferred from the KRC to the Kenya Ports Authority (KPA) through a Gazette Notice and an alteration of the KPA Act, the KRC plans to develop a new SGR rail port at Kisumu as part of phase 2b of its SGR project. A USD 5.4B commercial agreement for the phase 2 SGR works, which includes the development of the new Kisumu port, was signed between the KRC and China Communications Construction Company (CCCC) in 2016.

Cargo Transport (section 1.5.3.1)

- Termination of RVR concession contract – Due to RVR's failure to meet contractual obligations, Kenya and Uganda have recently started the process of terminating RVR's contract. In Kenya, the Nairobi High Court finalised the process by granting the order to terminate on the 31st of July 2017. Uganda expects to finalise the termination process by September of 2017. The termination of the RVR contracts entails that the rail and rail-wagon ferries revert to the URC and KRC in Uganda and Kenya, respectively.
- Revival and expansion of rail-wagon ferry system – Following from stakeholder consultations, MTBS understands that the URC aims to revive the rail-wagon ferry system. Thereto, the URC aims to procure design and construction works for a replacement vessel for the MV Kabalega shortly. Additionally, the URC stated that the Government of Tanzania (GoT), through the TPA and TRL, is willing to cooperate in the revival of the Lake Victoria link between Port Bell and Mwanza, as this may benefit the competitiveness of the Central Corridor route to Kampala.
- Potential for PPP in Ugandan Lake Victoria cargo transport activities – Following a meeting with the URC, MTBS has come to the understanding that the URC currently envsisions carrying out Port Bell operations and rail-wagon ferry operations itself. However, the URC is open to PPP structures being implemented.

Passenger Transport (section 1.5.3.2)

- Sigulu Islands Ferry - From stakeholder consultations, it has been identified that UNRA envisions developing a new ferry service between Lugala and the Sigulu islands, in the Eastern regions of the Lake. Thereto, UNRA has contracted the Danish firm JGH Marine A/S to design and construct the ferry. It is expected that the construction works will be completed in H2 of 2018.

1.1 Project Region

The project focuses on transport on and around Lake Victoria (the scope of the project is ringfenced by the three focus areas discussed in Appendix I). The catchment area of Lake Victoria, which encompasses parts of Uganda, Kenya, Tanzania, Rwanda and Burundi, has a population of around 35 million and a GDP of some USD 30 billion - about 40% of the total EAC economy.

Figure 1.1 Lake Victoria Catchment Area

However, the lake only borders to Kenya, Tanzania, and Uganda, the EAC's three largest member countries. The table below presents the allocation of lake area and estimated catchment area among the EAC countries.

Table 1-1 Lake Victoria Area Allocation

Country	Lake Surface Area		Catchment Area		Shoreline	
	Km2	%	Km2	%	Km	%
Tanzania	33,756	49.0	79,570	44.0	1,150	33.0
Uganda	31,001	45.0	28,857	15.9	1,750	51.0
Kenya	4,113	6.0	38,913	21.5	550	16.0
Rwanda	-	-	20,550	11.4		
Burundi	-	-	13,060	7.2		
Total						

Source: African Centre for Technology Studies (ACTS) and Lake Victoria Basin Commission (LVBC), 2011

1.2 Regional Transport System Overview

As Uganda is a landlocked country, it is dependent on a strong regional transport network for the majority of its imports and exports. The figure below provides an overview of the regional transport system, which consists of road, rail, and inland waterway connections. The network comprises the following two main corridors:

- Northern Corridor: the Northern Corridor connects Uganda to the port of Mombasa in Kenya and runs along the nothern edge of Lake Victoria.
- Central Corridor: the Central Corridor connects Uganda to the port of Dar es Salaam in Tanzania and runs along the southern side of Lake Victoria.

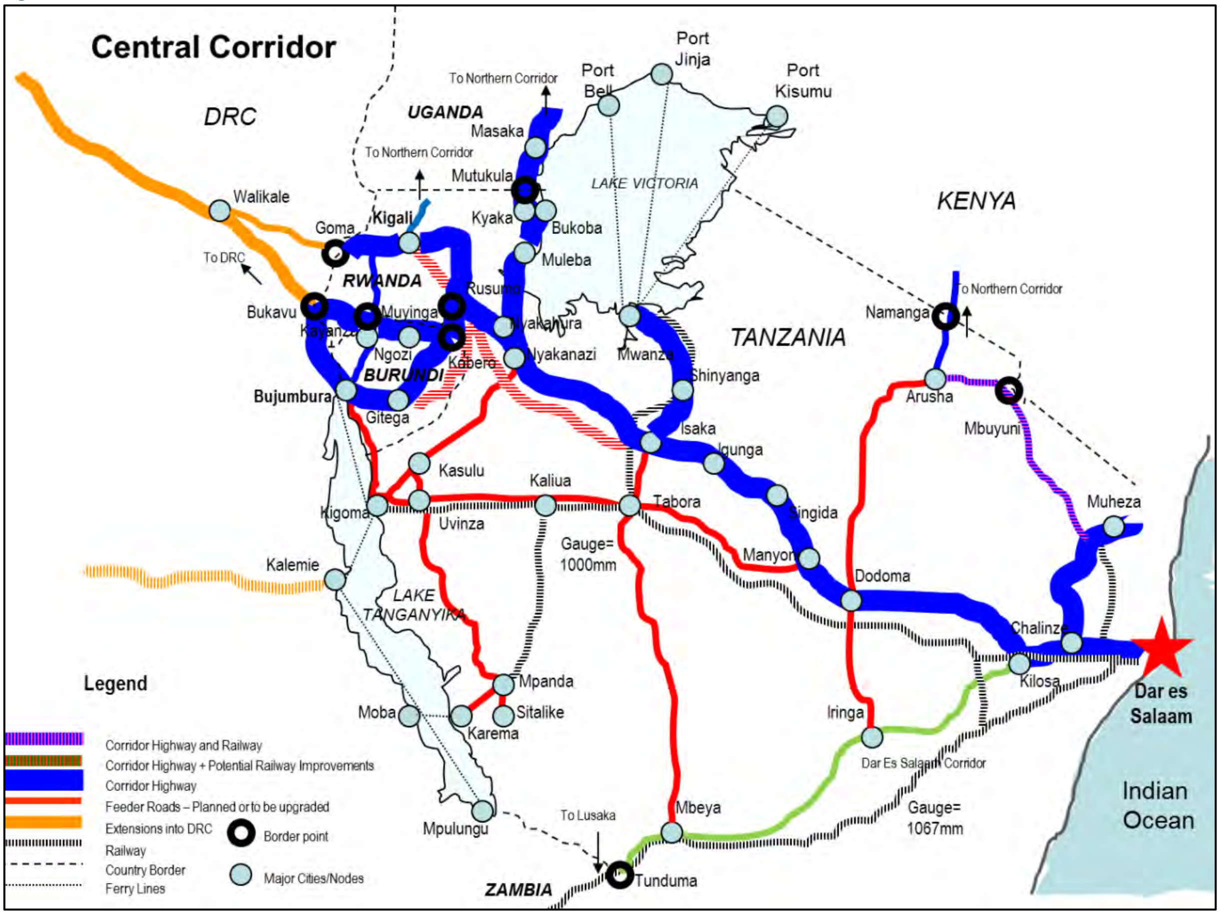
The following section further elaborate on the Central Corridor and the Northern Corridor. Subsequently, the lake transport system will be discussed in more detail.

1.3 Central Corridor

The figure below visualises the main connections of the Central Corridor. It can be observed that the Central Corridor provides two connecting options from Dar es Salaam port to Uganda:

- A direct highway connection from Dar es Salaam to Uganda, running along the southern and western shores of the lake.
- A highway or rail connection to the inland port at Mwanza, with a subsequent inland waterway link between Mwanza and the Ugandan inland ports of Port Bell and Jinja.

Figure 1.2 Central Corridor Overview



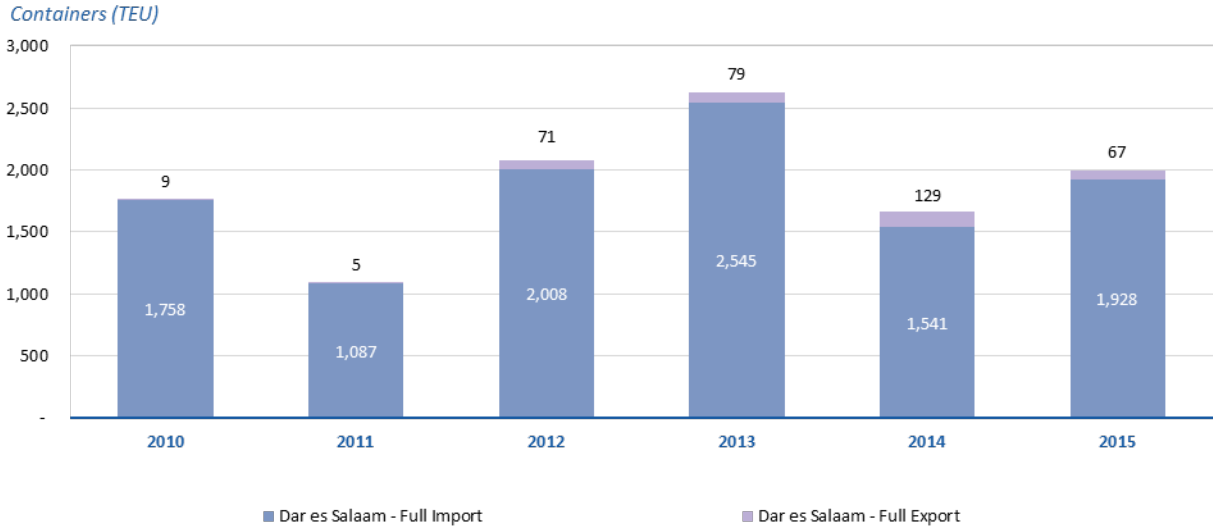
1.3.1 The Port of Dar es Salaam

In recent years, Ugandan importers and exports have preferred the port of Mombasa over the port of Dar es Salaam, due to the relative geographic proximity of the former port. As such, over the period from 2010 to 2015, the Port of Dar es Salaam only handled between 1 – 2% of Uganda's annual transit container volumes to and from Uganda. Table 1-2 provides an overview of Uganda's 2015 imports through Dar es Salaam, split by commodity group. Subsequently, Figure 1.3 presents the full transit container flows between Uganda and the port of Dar es Salaam, for the period from 2010 to 2015. A description of the facilities, throughput, and institutional setting at the port of Dar es Salaam are provided in Appendix II.

Table 1-2 Uganda 2015 Imports Through Dar es Salaam per Commodity Group

Item	Unit	Volume
2015 Containerised cargo flows from Dar es Salaam to Uganda	Metric Tons	18,934
2015 Dry bulk flows from Dar es Salaam to Uganda	Metric Tons	12,939
2015 Liquid bulk flows from Dar es Salaam to Uganda	Metric Tons	124,788

Figure 1.3 Dar es Salaam Port - Uganda Transit Containers



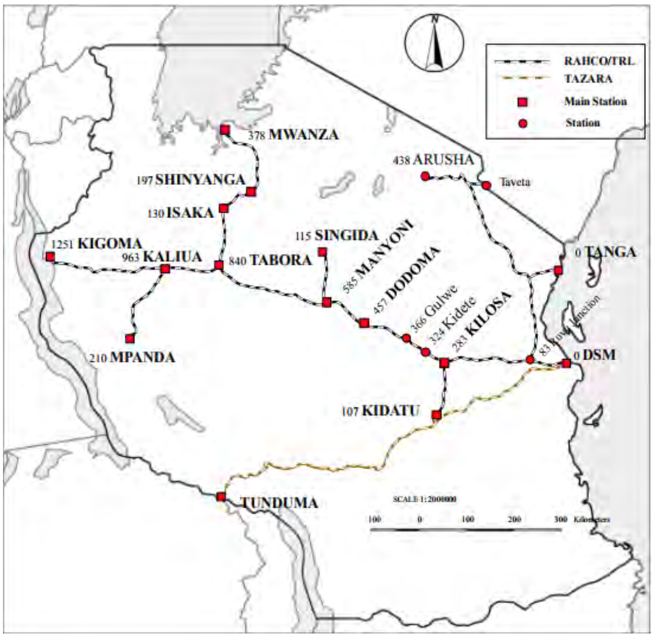
1.3.2 Road Network

Road remains the most important mode of transport, accommodating over 75% of cargo volumes on the Northern Corridor. The corridor's main road stretches from Dar es Salaam port westward, splitting into multiple roads that continue through Mutukula into Uganda, through Kabanga into Burundi, and through Rusumo into Rwanda. According to the Central Corridor Transport Observatory, transit times from Dar es Salaam port to the Ugandan border at Mutukula is currently approximately 4.3 days.

1.3.3 Rail Network

Current Situation

Rail transportation along the Central Corridor is organised by Tanzania Railways Limited (TRL). The Central Corridor rail network is organised by Tanzania Railways Limited (TRL) and comprises over 2,700 km of meter gauge track. The network does not directly connect to Uganda; instead, the rail network connects to the Mwanza inland port, from where cargo can be transported to Uganda by rail-wagon ferry.



The rail network used to be an important component of the Central Corridor; however, lack of investments in new infrastructure and maintenance have resulted in unreliable and inefficient services. Speed restrictions of 13–50 km/hr are in place on many sections of the track due to their poor condition. Given these speed restrictions, train turnaround is estimated at about 18 days from Dar es Salaam to Mwanza or Kigoma, instead of the scheduled 10 days. Consequently, the rail network has experienced a sharp decline in traffic flows. Currently, less than 5% of the Central Corridor traffic moves by rail.

The TRL was previously operated under a concession by RITES of India and the Government of Tanzania, but the concession was cancelled in 2011 due to labour conflicts and declining traffic flows.

Future Development

The development plans of the Government of Tanzania (GoT) are twofold: firstly, there are plans for rehabilitating and improving the current meter gauge network, for which TZS 300B has been made available by the World Bank; secondly, the Government of Tanzania (GoT) aims to develop a 2,200 km Standard Gauge Rail (SGR) network. Thereto, the Chinese Ex-Im bank has agreed to provide a loan of USD 7.6B in H2 of 2016.

The main SGR line, which is estimated to have a capacity of 17 mtpa, will measure 1,216 km and will run from Dar es Salaam to Mwanza, comprising the following sections:

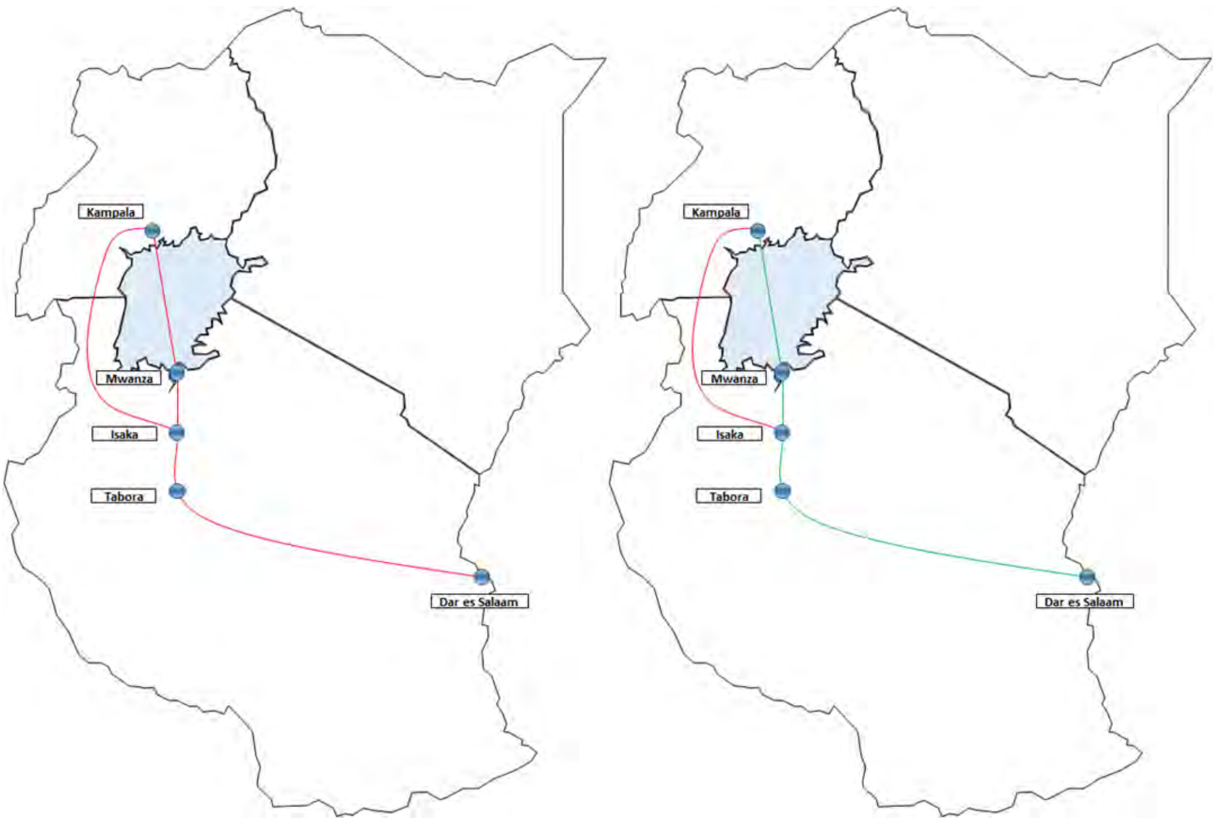
- Dar es Salaam – Morogoro (205 km)
- Morogoro – Makutupora (336 km)
- Makutupora – Tabora (294 km)
- Tabora – Isaka (133 km)
- Isaka – Mwanza (248 km)

In early 2017, the GoT awarded a USD 1.2B contract to Yapi Merkez Insaat Ve Sanayi (Turkey) and Mota-Engil (Portugal) for construction of the first 205 km section. Procurement processes for the other sections are expected to be started in the remainder of 2017.

Initial Impact Assessment

The figure below provides an overview of the impact of the proposed SGR connection on the Central Corridor routes to and from Uganda. The map on the left visualizes the current situation, where the Central Corridor is unable to attract substantial transit cargo volumes to/from Uganda, due to an inefficient connection to Mwanza and a deteriorated lake transport system. Additionally, the highway route around the lake is long and costly, rendering it uncompetitive against the route from Mombasa port. The map on the right visualizes the future situation, in which the SGR connection from Dar es Salaam to Mwanza makes the rail and lake route more competitive (assuming a developed lake transport system).

Figure 1.4 SGR Impact - Central Corridor



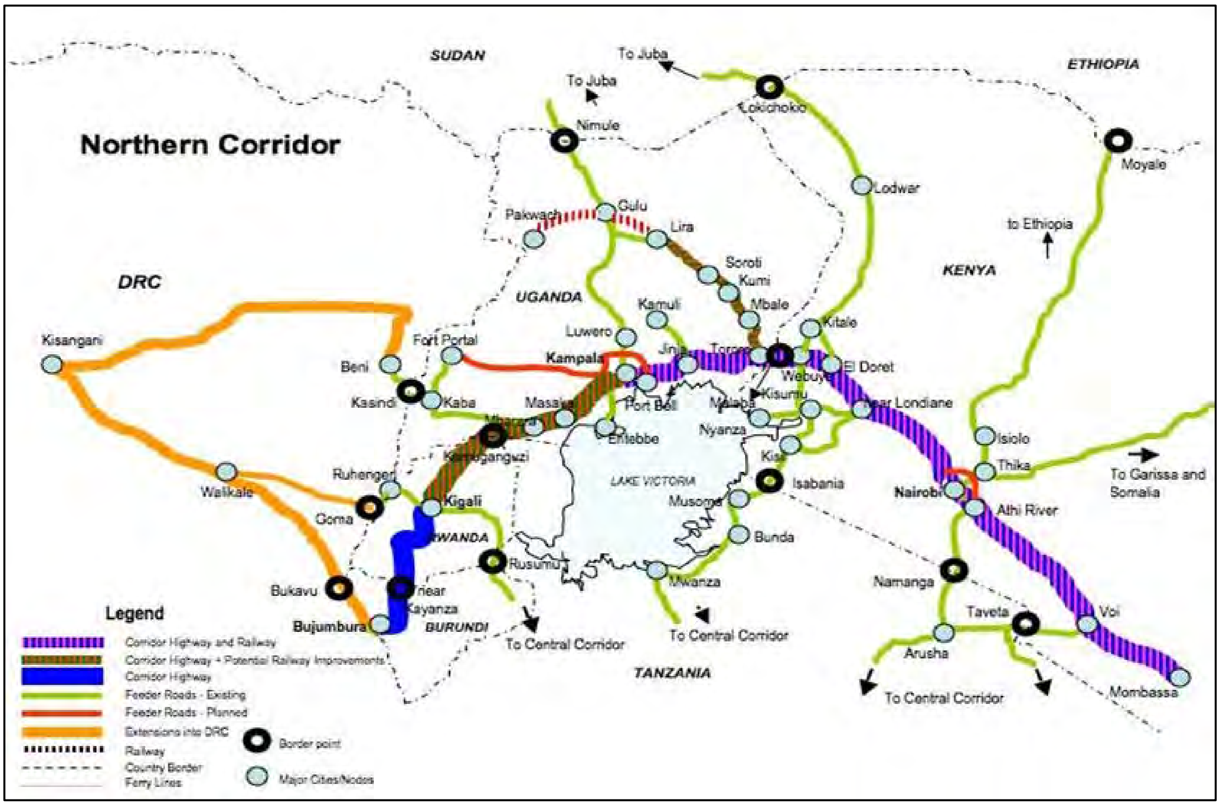
1.4 Northern Corridor

The figure below visualises the main connections of the Northern Corridor. It can be observed that the Northern Corridor provides two connecting options from Mombasa port to Uganda:

- A direct highway connection from Mombasa port to Uganda.
- A direct rail connection from Mombasa port to Uganda.

Additionally, the inland port of Kisumu can be used to transport goods to Port Bell or Jinja in Uganda. However, the rail operations from Mombasa to Kisumu halted, as the service was deemed uneconomical by the private concessionaire Rift Valley Railways (RVR); this resulted in a sharp decline in the use of Kisumu as a node in the transit trade between Mombasa and Uganda. As such, the links between Kisumu, Jinja, and Port Bell are currently mainly used to transport locally produced and consumed products, such as fertilizer, cotton, and sugar.

Figure 1.5 Northern Corridor Overview



1.4.1 The Port of Mombasa

The port of Mombasa is the main point of entry for cargo from and to Uganda, handling over 95% of the transit cargo destined for Uganda. A description of the facilities, throughput, and institutional setting at the port of Mombasa are provided in Appendix II. Figure 1.6 provides an overview of the full import and export containers between Mombasa port and Uganda; Figure 1.7 provides an overview of the total transit cargo flows between Mombasa and Uganda. The substantial discrepancy between imports and exports implies a significant trade deficit in Uganda.

Figure 1.6 Mombasa - Transit Containers to/from Uganda

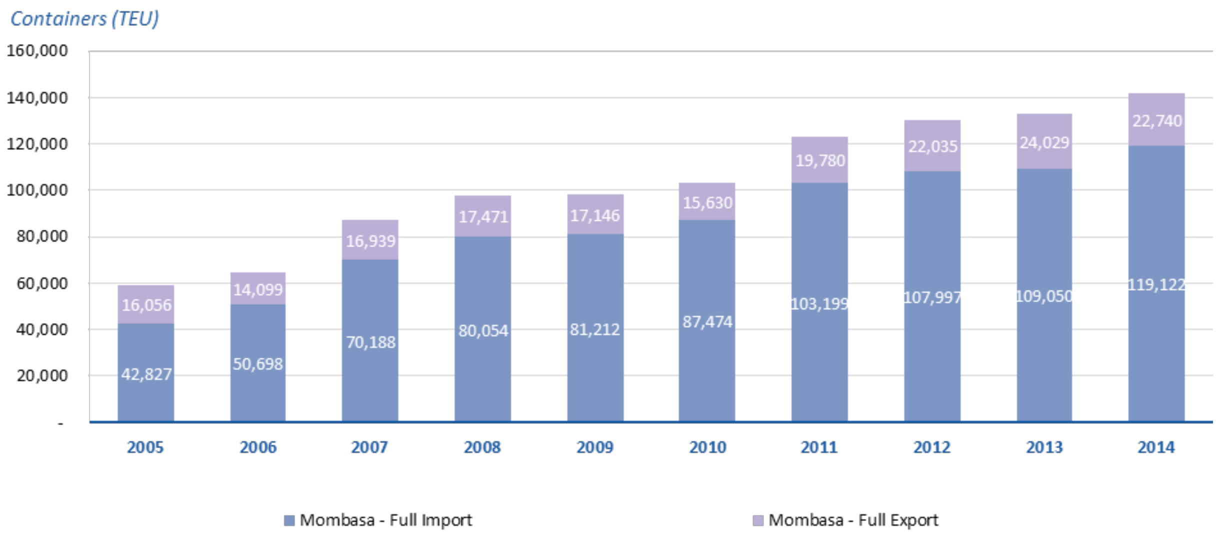
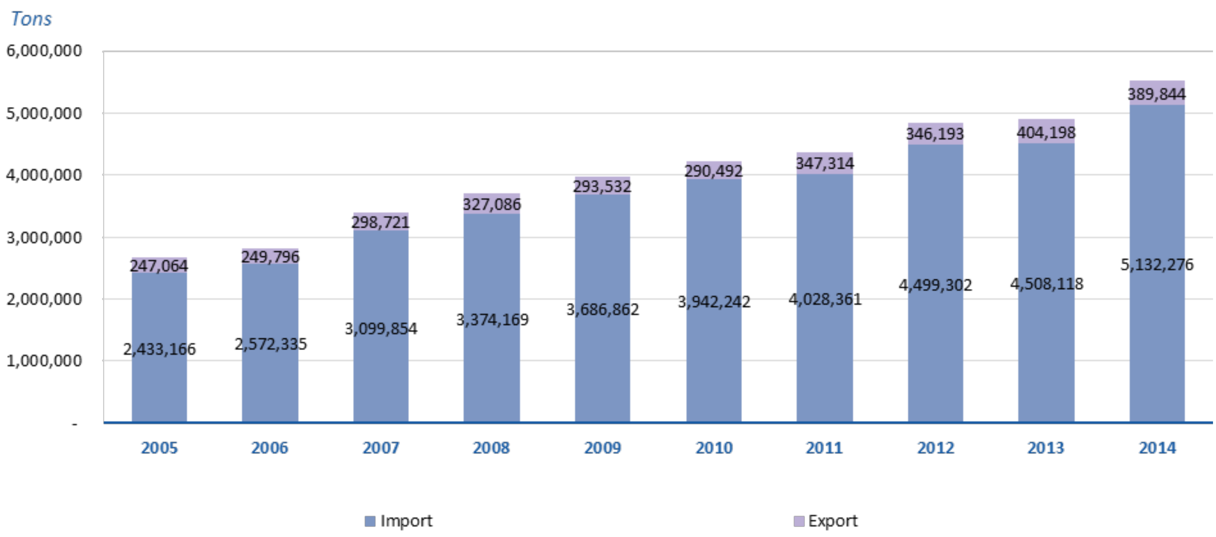


Figure 1.7 Mombasa - Transit Cargo to/from Uganda



1.4.2 Road Network

The total Northern Corridor road network measures over 14,000 km in length and runs across the 6 countries connected by the corridor. Of this network, 2,287 km is situated in Uganda and 1,710 km is situated in Kenya. The corridor's trunk road, stretching from Mombasa to Kampala and on to Bujumbura, covers 1,970 km. Overall, nearly 65% of the road network is considered to be in a poor condition; however, the trunk road, which carries 90% of the cargo, is considered to be in a reasonable to good condition.

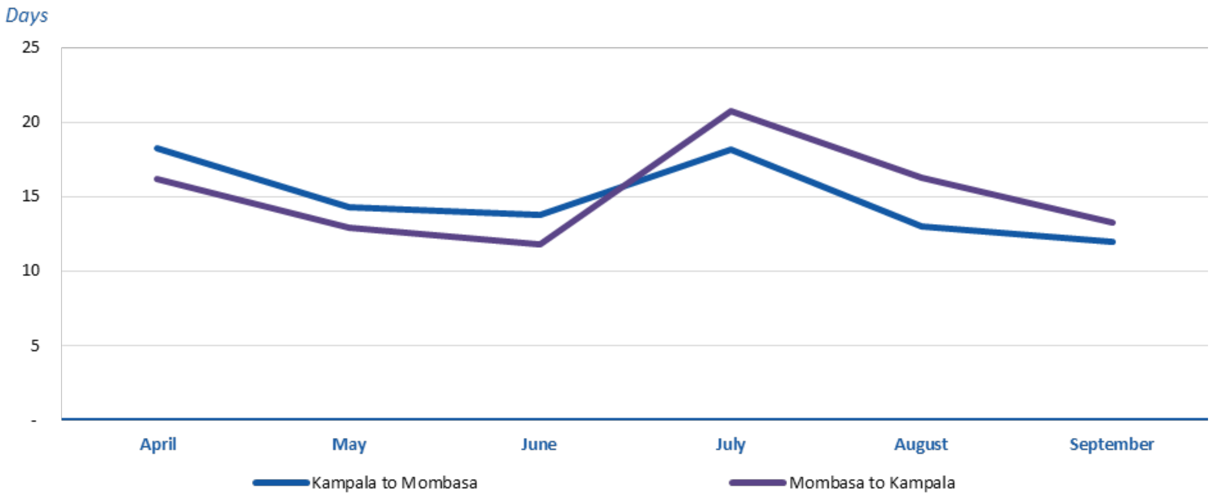
The highway from Mombasa to Kampala, via the border crossing at Busia, covers 1,170 km and is in a relatively good condition. According to the Northern Corridor Transit and Transport Coordination Authority, based on transporter surveys between 2012 and 2016, road freight charges from Mombasa to Kampala are between USD 2,000 and USD 3,000 for a single truck move. Additionally, truck transit time between Mombasa and Kampala range from 167 to 394 hours, as shown by 2015 and 2016 electronic data collected by the Kenya and Uganda Revenues Authorities.

1.4.3 Rail Network

Current Situation

The main railway line, which was built in 1891, comprises a 1,650-km meter gauge line from Mombasa to Malaba, and on to Kampala and Kasese in Western Uganda. However, due to the current state of infrastructure and equipment, train transit times between Mombasa and Kampala are substantially higher than average truck transit times of approximately 10 days, as can be observed from the figure below. Due to the limited efficiency and reliability of the rail network, less than 4 per cent of the cargo transported along the Northern Corridor is transported by rail.

Figure 1.8 Rail Transit Times between Kampala and Mombasa



In Kenya, there used to be an additional passenger and cargo branch line from Nairobi to Nakuru, and on to Kisumu. However, the latter part of this branch line is derelict, due to a lack of necessary maintenance and rehabilitation works. Additionally, the private concessionaire Rift Valley Railways (RVR) considered this section of the rail network to be uneconomic, resulting in the required services on this rail stretch to be halted. Due to RVR's failure to meet contractual agreements, the KRC has terminated RVR's concession contract in July of 2017; as such, operational responsibilities of the Kenyan railway network will revert to KRC.

In Uganda, the rail connections to the ports of Port Bell and Jinja are currently dysfunctional, mainly due to deteriorated infrastructure; the lack of use of the rail has subsequently also resulted in substantial encroachment issues. Market sources have stated that the Uganda Railways Corporation (URC; the public rail authority) and RVR aim to resolve the encroachment issues and proceed with rehabilitating the rail connections. However, nothing has materialized as of yet, and no clear timeline is available. Additionally, similar to its Kenyan counterpart, the URC is in the process of terminating the RVR. Once the process is completed, which is foreseen for H2 2017, operational responsibilities of the Ugandan rail network will revert to the URC.

Future Development

In order to substantially increase cargo and passenger rail transport capacity along the Northern Corridor, a Standard Gauge Railway (1,435 mm) is currently being developed. The phasing of the Kenyan SGR development project is shown in the figure below.

Figure 1.9 Kenya SGR Network

The first phase of the SGR development, comprising the section between Mombasa and Nairobi, has recently been completed by China Roads and Bridges Corporation (CRBC). The total cost of the phase 1 development is estimated at KSH 327.0B, of which 90% was financed through a loan from the Chinese ExIm Bank. Subsequently, the SGR will be extended to Naivasha, Kisumu, and finally to the Kenyan-Ugandan border at Malaba in phase 2; construction works for this second phase are also to be carried out by CRBC. The entire Kenyan SGR project is scheduled for completion by 2021. Additionally, the second phase SGR development includes the development of a new Kisumu rail port and an expansion of the Inland Container Depot (ICD) at Embakasi in Nairobi.

In Uganda, a Standard Gauge rail line is to be constructed between Kampala and Tororo, to connect to the Kenyan SGR network. The Ugandan SGR project will comprise the following main sections:

- Northern line: runs from Tororo to Mbale, Soroti, Lira, and Gulu; from Gulu, the SGR network will split up to connect to South Sudan, at Nimule, and the Democratic Republic of Congo (DRC), at Goli.
- Eastern line: runs from Tororo to Jinja, and on to Kampala.
- Western line: runs from Kampala to Bihanga, and on to Mpondwe at the Uganda-DRC border.
- South-western line: runs from Bihanga to Mbarara, and on to Mirama Hill at the Uganda-Rwanda border.

The sections are also visualized in the figure below.

Figure 1.10 Uganda SGR Network

The first two sections, comprising the Northern line and Eastern line, will comprise 926.4 km of tracks, and will be constructed by China Harbour Engineering Company (CHEC).

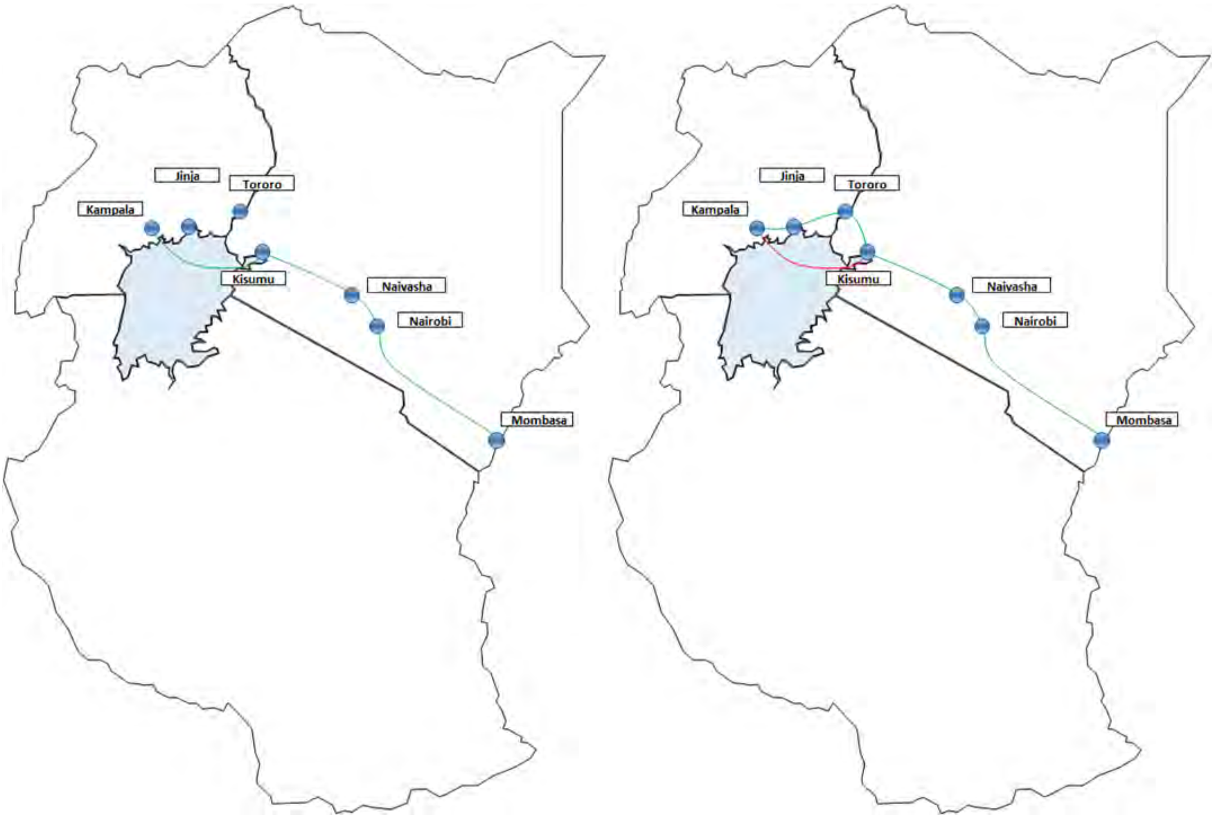
Initial Impact Assessment

The envisioned SGR connection to Kisumu may have a positive impact on Lake Victoria trade, as the competitiveness of multimodal (SGR and lake transport) transit cargo transport from Mombasa port to Kampala will increase substantially.

Finally, when the Kenyan SGR project reaches Malaba, and connects to the envisioned Ugandan SGR network, the port of Mombasa will be directly connected to Kampala by rail. As such, it is expected that the positive impact of the SGR project on Lake Victoria trade may largely be neutralized over the medium to long term, as the all rail route from Mombasa to Kampala will likely be more competitive than the multimodal routes. This is mainly due to the costs concerned with the additional handling required for the multimodal route (SGR and lake transport).

The envisioned short to medium term and medium to long term situation are visualized in the figure below. In the left figure, the short to medium term situation is captured, showing SGR connections from Mombasa to Kisumu. As it is expected that the Ugandan sections of the SGR project will be completed at a later stage, the multimodal (SGR and lake trade) routes will be the most competitive transport options. The right figure shows the medium to long term situation, in which the completion of the Ugandan sections of the SGR project weaken the competitiveness of the multimodal route.

Figure 1.11 SGR Impact – Northern Corridor



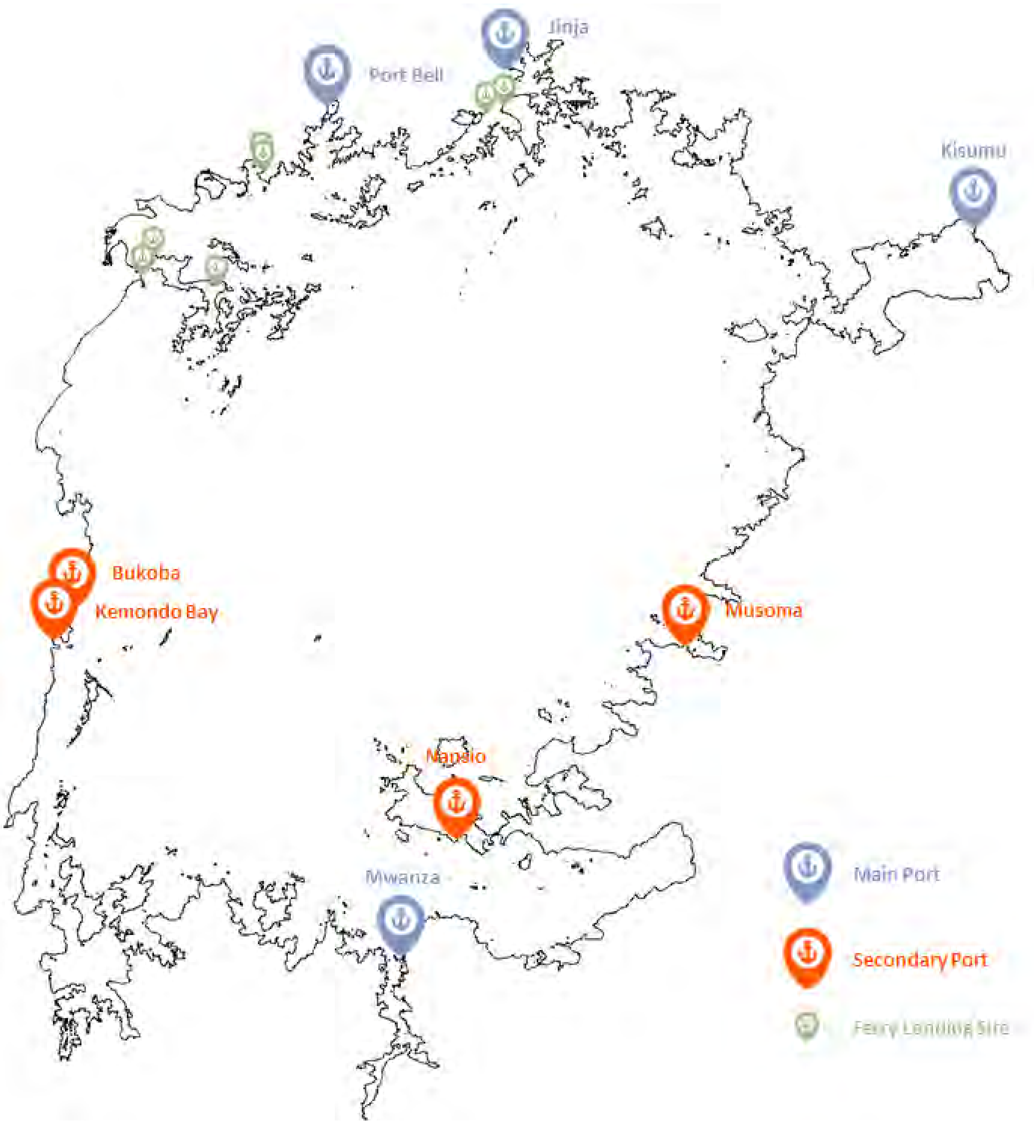
1.5 Lake Transport System

1.5.1 Overview

Historically, the shoreline's complex topography has played a factor in the delayed development of the road network around the lake. Hence, marine transport on the lake, together with the rail network, played a key part on the transportation of cargo and passengers to and from the land-locked countries. The Lake Victoria basin comprises 4 main ports: Port Bell and Jinja in Uganda; Mwanza in Tanzania; and Kisumu in Kenya. Of these ports, Mwanza, Port Bell, and Kisumu are the largest in terms of throughput. Smaller ports include Musoma, Bukoba, and Kemondo Bay in Tanzania. Kisumu (Kenya) was established as a shipbuilding and assembly centre on the Lake before the end of the first World War, with ferries and cargo ships travelling to Uganda. By the mid-20th Century, the East African Railways and Harbours Corporation (EARHC) operated regular sailings from Kisumu to Port Bell in Uganda and Mwanza in Tanzania, using rail ferries that carried rail wagons loaded directly from rail tracks in the three ports. Typical journey times were 13 hours between Port Bell (Uganda) and Kisumu (Kenya), and 19 hours between Port Bell and Mwanza (Tanzania).

Besides the cargo transport system, ferry services have been developed more recently, in order to provide a safe passage to the mainland for inhabitants of the islands on Lake Victoria. The figure below provides an overview of the cargo ports and developed Ugandan ferry landing sites.

Figure 1.12 Lake Transport System Overview



1.5.2 Lake Ports

1.5.2.1 Current Situation

Much of the physical infrastructure in the lake ports is currently in a dilapidated state. All the ports are based on traditional general cargo traffic except for the ports of Bell, Jinja, Kisumu and Mwanza which were initially developed for railwagon RoRo traffic and equipped with a linkspan. None of the ports on Lake Victoria has container handling equipment. The sections below further elaborate on the identified main Lake Victoria ports (a more detailed overview of the largest lake ports is provided in Appendix II). The following lake ports are briefly discussed here:

- Port Bell, Uganda
- Jinja, Uganda
- Mwanza, Tanzania
- Bukoba, Tanzania
- Kemondo Bay, Tanzania
- Musoma, Tanzania
- Kisumu, Kenya

This project covers the existing Lake cargo ports of Uganda, being Port Bell and Port Jinja. During the inception visit, the ports of Port Bell and Jinja were visited and, hence, observations have been added for those ports.

Port Bell, Uganda

Port Bell is situated along the northern shores of Lake Victoria located at the head of the Murchison Bay, south-east of Kampala. In the past, the port handled approximately 0.5 million tons of cargo per annum. Although facilities for the transfer of goods have existed at Port Bell since 1901 (and between Port Bell and Kampala since the subsequent construction of a 9km long meter gauge railway line in 1931), Port Bell was constructed in the 1960's as a rail-wagon terminal, although the port also has one general cargo berth of about 85m. The port terrain is about 0.7 ha including buildings and the pier but excluding the rail shunting yard located north west of the port. The rail-wagon terminal was constructed on reclaimed land, and has a pier of about 85 meters long and 28 meters wide. This pier acts as a causeway to the RoRo rail wagon link-span and the rail ferry berth with about 3.5m water depth. The link-span has two hoisting towers (designed to raise and lower the rail link-span depending on the freeboard of the ferry and differences in water levels), guide walls, and berthing dolphins for mooring the ferries for stern loading/offloading. The pier also has a sheet piled wall construction (length about 80m) with a reinforced concrete deck, the eastern part of which can be used for loading/offloading ships using LoLo equipment. Further the pier has two dolphin moorings (at distance of 38m from each other) on the west side of the pier and they are connected by a gangway with a length of 20m each. The both dolphins are currently used to moor the laid-up vessel MV Pamba. The head of the pier next to the rail ferry berth on the east side is currently in use to berth a floating dock (dimensions about 95m x 26m).

Observations

Port Bell has a Roll on - Roll Off (RoRo) rail wagon link-span and a general cargo berth. Its rail infrastructure (meter gauge) is in poor state but still functional; however, the port has no rail accessibility, as encroachment on the connecting rail line prohibits trains from entering the port. Furthermore, the wharf pavement is poor but operational. Some drainage covers are missing, leading to unsafe operations. There is an old crane on the eastern quay to facilitate 'Lift on - Lift off' (LoLo) operations. The mooring facilities are poor with broken fenders and deformed gangways on the jetty. The port operates a refurbished floating dock which is operational and in fair condition. The port buildings consist of a warehouse, toilets and customshouse which are in dilapidated state. The warehouse is not used due to the poor state. The port has limited operating space but the port is fenced and has a simple gate. Mooring spaces for roro vessels (except for the rail ferry) do not exist and the mooring space of 80m for general cargo vessels is rather limited as the same berth is used for general mooring for non-cargo related activities. The road access is very poor and rather congested when the port is loading/discharging general cargoes due to the lack of proper truck waiting areas. A small local fishery village is located near the entrance on the east side of the port. In terms of hinterland connectivity, the port is connected to the main Jinja road through a 6km two-lane bitumen road. Additionally, the port has a direct rail connection to the Kampala main station; however, this connection is currently derelict and encroached.

Jinja, Uganda

The rail-wagon terminal at Jinja is located 80 km east of Kampala. The port is located outside the estuary of the Victoria Nile. The rail-wagon terminal design is similar to that at Port Bell, with two mooring jetties on the east and west side. However, the pier is only 15m in width and has a pile sheeted quay wall of only 60m on the east side. The port area is around 0.4 ha, excluding the rail shunting yard located in the north-east section of the port. The link-span has a length of around 30m and a width of 6.5m. Additionally, the port has a slipway.

Observations

Jinja port is in very poor condition with most of the rail wagon link span planking deteriorated and fendering systems completely decayed. The water depth was said to be 4m. The general cargo berth mooring facilities (quay wall and bolders) are damaged and the quay pavement is very poor. The main winches for the link span require an overhaul. The port's rail infrastructure, consisting of tracks to the link-span and a rail shunting yard, is not functional and is in very poor condition. The rail track connection to the national rail network is missing due to vandalism. The rail jetty is missing proper fenders and the jetty gangway requires refurbishments. The oil pipeline at the western jetty to bunker vessels is not functional. The slipway is derelict and overgrown with plants. The road pavement in the port is in very poor condition; the access roads to the port are either unpaved or also in very poor condition. Fencing is not available and the gate is very poor, whilst navigational lights are present. The port showed no operational activities and it was explained that occasionally some vessels are handled when compiled cargo volumes are sufficient. The general cargo berth is currently used for berthing vessels most of the time. Additionally, there is a fishing village to the west (about 120m down the road) of the Jinja pier and a floating fish farm inside the lagoon towards the east.

Mwanza, Tanzania

Mwanza port consists of two parts: Mwanza South and Mwanza North. Mwanza South Port is the centre for all cargo operations, whilst Mwanza North port is the passenger terminal. Mwanza South is situated within a natural shallow bay on the eastern shore of Mwanza Gulf; Mwanza North is situated on the south-eastern shore of Massenga Bay. The Mwanza South port facilities are dispersed over an 8.5 Ha area. The majority of this area is either unused or is occupied by railway lines that are used for parking railcars, before they are shunted onto ferries via the rail linkspan (which was constructed in 1964). The main quay (constructed in the late 1930's) is 250 meters long and consists of a sheet piled wall with a reinforced concrete deck. A rail line loop runs along the quay. The southern end of the quay (adjacent to the link-span) is currently used to load/discharge oil products to tankers/ships. The quay apron is unusually constructed on a two-tier level with a difference of 0.7 meters in height over a length of 190 meters. The upper level fronting the cargo and transit sheds is some 7 meters in width and this reduces the effective working area on the quayside to some 5 meters in width, greatly hindering horizontal transfer operations. Recent block work modifications at the northern end of the quay have raised the apron to similar levels over a length of 60 meters. This area is currently used as a docking and maintenance wharf and provides hard-standing storage and yard space.

Mwanza North port is the passenger terminal, located immediately adjacent to Mwanza city. Port facilities have been constructed on a promontory of artificial land (developed in the late 1930's) and consist of two berths: a main berth of 82 meters in length, and a secondary berth of some 50 meters in length. Both berths are again of a sheet piled wall design with a reinforced concrete deck. Part of the secondary berth and apron has been raised 0.6 meters in height. The port has a central passenger/cargo shed and is served by a rail spur that terminates on the main berth. A concrete ramp has been constructed at the head of the secondary berth to allow RoRo operations. The proximity of the outlet of the River Kenge, Mwanza's main river/stormwater/sewerage outfall, artificially extended into the lake, has led to considerable siltation preventing use of the RoRo facility.

Bukoba, Tanzania

Bukoba port serves as the gateway to the region west of Lake Victoria and is the second largest port after Mwanza. Bukoba is the capital of Kagera Region situated on the western shore of Lake Victoria. The port is located south of the city. It is served by a regular connection via Kemondo Bay to Mwanza, on Mondays, Wednesdays, and Fridays. The service is provided by MV Victoria, MSCL's largest cargo-passenger ship, which is capable of carrying 200 tonnes of cargo and 1,200 passengers. Bukoba Port has three berths built in 1945, which are still in use. The main one is Berth No. 1, where the MV Victoria is accommodated. Berths No. 2 and No. 3 serve smaller ships. The port has three cargo sheds and one passenger shed. The city is also served by ground transport to Kampala every day. Because of the well-developed road network on the western shore of Lake Victoria, bus transport operated by the private sector is competitive between Bukoba and Mwanza.

Kemondo Bay, Tanzania

Kemondo Bay (originally Lubembe Harbour), which was developed in 1974, is located approximately 18 km south of Bukoba. It is situated in a circular bay of moderate depth, protected from the open waters of the lake by a small headland to the south. The port covers an area of approximately 2.2 ha. Although principally a rail ferry port, there is no rail hinterland, which hinders the use of the port as a transit route for Rwanda/Burundi. Berthing facilities consist of a rail wagon terminal (a link-span) with a passenger/cargo quay (the main quay). The berth comprises a sheet-piled wall construction with a reinforced concrete deck, measuring 7m wide and 47m long. An offshore mooring dolphin, connected to the quay by a suspended gangway, forms part of main berth. A 20m general berth has a similar construction. Reclaimed land on the southern part of the port is fronted by a sheet piled wall, providing additional berthing space (originally used as a cattle berth). An extension of reclaimed land, with rock armoring, on the northern side of the port has allowed the construction (in 1993) of a RoRo facility for ramped vessels at the head of the main berth. A large passenger building is located to the north, adjacent to the fenced yard area, in which the port offices are located.

Musoma, Tanzania

The port of Musoma is situated in Mara Bay, a large sheltered bay bound by hilly country that characterizes the eastern shore of Lake Victoria. The original port pier was constructed on leeward side of Musoma Point, a narrow peninsula that extends into the lake on the southern shore of the bay - now a hotel. The existing port, constructed between 1966 and 1968, is located south east of Musoma Point, on a small headland adjacent to the town. Port facilities, constructed on artificial land consist of a rail wagon terminal with a fixed link-span bridge, shore abutment, long and short guide walls. The opposite face of the long guide wall (SE) forms the passenger berth, which is 100 meters in length with an apron 4.5 meters in width. The cope height is 3 meters. Perpendicular to the landward end of the passenger berth is a general cargo berth of 55 meters, a paved apron area of 9.5 meters width and a cope height of 2.1 meters. All wagon ferry guide walls, passenger and general cargo berths are of steel sheet pile wall construction with a reinforced concrete deck. Port land (covering some 3 ha.) is dominated by railway track required to load/offload and shunt rail wagons within the yard area. Due north west of the existing port site, adjacent to Musoma Point, there are two offshore mooring dolphins for berthing tank-ships for ship to shore petroleum transfers. There are no cargo handling facilities of any kind and throughput has steadily declined due to competition from road transport taking advantage of the paved road network linking Musoma to Kenya (via Tarime and Sirari) in the North, and Mwanza (via Bunda) in the South.

Kisumu, Kenya

The port of Kisumu is situated in the north-eastern corner of Lake Victoria, on the southern shore of a small sheltered bay, fronting Kenya's third largest city. Port facilities are grouped in a wide area of land some 20 ha in size. Most of this area is occupied by dockyard facilities and rail sidings, the latter which run to the main-quay or the rail-wagon terminal located its western end. The main quay is some 260 meters in length with an apron about 12 meters wide. A single warehouse of 80 meters by 16 meters is provided on the main quay, behind which is a paved open storage are of approximately 3,000 m2. The rail wagon terminal is constructed on artificial (reclaimed) land almost perpendicular to the main quay. It, like those developed in Mwanza, Port Bell and Jinja consists of a link-span bridge, hoisting towers, guide walls and inner and outer mooring dolphins (connected by a suspended walkway). However, the link-span is in a poor condition and is not being used. Additionally, the rail line connecting Kisumu has not been used for over 10 years, as RVR deemed the Kisumu rail route uneconomical.

1.5.2.2 Developments

Through desktop research, a review of existing documents, and stakeholder consultations, MTBS has identified the following envisioned Lake Victoria port developments:

- **Lake Victoria Transport Program** – Under the Lake Victoria Transport Program, which is to be (partially) funded by the World Bank and the European Union, rehabilitation and improvement works are scheduled on all the major lake ports and their connecting infrastructure. Additionally, technical assistance towards implementation of lake safety and navigability measures is included in the program.
- **Bukasa Port (Uganda)** – The Bukasa port project comprises the development of a new port in Kampala, near the existing Port Bell. The port project is partially funded by the Government of Germany and is currently in the preliminary design phase, for which a consultant has been procured. Additionally, a high level financial and economic assessment has been completed. The port development is aimed at enabling accommodation of the expected future

cargo volumes on Lake Victoria. The port is to be developed in two phases; the first phase will provide an annual cargo capacity of 2.3 million tons, whereas the second phase will add an annual capacity of 5.2 million tons. In the long term, the URC aims to develop Bukasa as the main cargo port and connect the port to the SGR network. As Bukasa will be connected to the SGR, the URC envisions keeping the meter-gauge connection at Port Bell. While it seems that a draft preliminary design of Bukasa port has been completed, such a design has not been made available to MTBS for the purpose of this study.

- **Lukaya Port (Uganda)** – During stakeholder consultations, the Chinese owned Mango Tree Group presented plans for a port development at Lukaya, approximately 100 km southwest of Port Bell. The rationale behind this location is twofold; its location near an arterial road and outside of the congestion of Kampala enables efficient transport activities to the port's hinterland and its location is well suited to serve mines in Western Uganda. The plans for the Lukaya port include a 40,000 oil depot that can be used for Uganda oil reserves, a dry bulk cargo terminal aimed at handling iron ore and copper ore from mines in Western regions of Uganda, and the development of an industrial zone adjacent to the port.
- **Kisumu SGR Port (Kenya)** – While the current Kisumu port has been formally transferred from the KRC to the Kenya Ports Authority (KPA) through a Gazette Notice and an alteration of the KPA Act, the KRC plans to develop a new SGR rail port at Kisumu as part of phase 2b of its SGR project. A USD 5.4B commercial agreement for the phase 2 SGR works, which includes the development of the new Kisumu port, was signed between the KRC and China Communications Construction Company (CCCC) in 2016.

Figure 1.13 Lake Victoria Port Developments

1.5.3 Maritime Services

The maritime transport services on the lake comprise both cargo and passenger services. These two transport components are discussed in the sections below.

1.5.3.1 Cargo Services

Current Situation

Organised cargo services on the lake were initially developed by the East Africa Rail & Harbours Corporation (EARHC) by the mid 20-th Century. After the breakup of the EARHC in 1977, the cargo services on the lake were dominated by the Marine Services Company Limited (MSCL) - formally the marine division of Tanzania Railways Limited (TRL), the Uganda Railways Corporation (URC), and the Kenya Railways Corporation (KRC). Their rail-wagon ferries, of which the largest can carry 19 rail wagons (equivalent to 38 TEU), had a monopoly on the carriage of rail cargo between the three East African States. The table below provides an overview of the main rail-wagon ferries and their respective owner, technical characteristics, and operational status.

Table 1-3 Lake Victoria Cargo Transport – Rail-Wagon Ferry Overview

Wagon Ferry	Owner	Operational Status	LOA (m)	Draft (m)	Capacity (Ton)
MV Pamba	URC*	Laid-up in Port Bell	91.60	2.70	850
MV Kawaa	URC*	Operational	91.60	2.70	850
MV Kabalega	URC*	Sunk****	91.60	2.70	850
MV Umoja	MSCL**	Operational	92.00	n/a	1200
MV Uhuru	KRC***	Laid-up in Kisumu	92.00	n/a	1200

*Uganda Railways Corporation; **Marine Service Company Limited; ***Kenya Railways Corporation; ****Caused by a collision with MV Kaawa on the 8th of May 2005

In 2006, the operations of the Ugandan and Kenyan rail-wagon ferries were conceded to Rift Valley Railways (RVR), as part of RVR's national rail operations concessions in these countries. However, under the RVR operations, the utilisation of the rail-wagon ferries declined substantially, due to the following factors:

- Deteriorating condition of rail infrastructure and rolling stock – Due to a lack of investments in the rail infrastructure and rolling stock, the utilisation of the rail network and the Lake transport system, as an extension of the rail network, declined.
- Cancellation of rail cargo services to Kisumu port – The connection between Nakuru and Kisumu in Kenya was considered uneconomic by the RVR, as this rail stretch could not accommodate large trains and transporting cargo around the Lake to Kampala resulted in higher revenues for the RVR. As such, the private rail operator halted the rail connection to Kisumu port around 2010, resulting in the traditional rail-wagon system on the Kisumu – Port Bell link becoming derelict.
- Encroachment on the rail connection to Port Bell – As the Port Bell rail link was deteriorating and no longer utilised, encroachment issues ensued. This further hampered revitalisation of the intermodal rail-lake transport system.
- Deterioration of the port infrastructure and vessel fleet – Besides the rail infrastructure and rolling stock, the condition of the Lake ports and rail-wagon ferries also deteriorated, due to a lack of maintenance and reinvestments.

Due to the deterioration of the traditional transport system, privately owned and operated vessels have become increasingly important for the Lake transport system. There are currently more than 20 privately operated vessels, excluding the wooden boats that are often used for transport of passenger and small cargo volumes. The majority of cargo vessels are RoRo vessels, due to the versatility of such vessels and their complementarity to the currently dominant truck transport sector. Table 1-4 provides an overview of the privately-operated vessels on the lake.

With an estimated total carrying capacity of over 8,000 tons, the privately-owned vessels account for approximately 80% of the organised cargo carrying capacity on the lake, as only two of the rail-wagon ferries are operational.

Table 1-4 Lake Victoria Cargo Transport - Private Cargo Vessel Overview

Operator	Vessel	Flag	Capacity (Tons)
Moil	Allez	Kenya	400
Bilaport	Bilaport	Kenya	300
Matata	Kivila Matata	Kenya	200
KFL	Thor	Tanzania	270
	Orion 2	Tanzania	500
Salma	Samar 1	Tanzania	280
	Samar 2	Tanzania	280
	Samar 3	Tanzania	400
Vero Shipping	Vero	Tanzania	400
African Minerals	Indi	Uganda	200
	Jack	Uganda	200
LVMS	Satnam	Kenya	400
	Sahibji	Kenya	280
Tricon	Tanker 1	Kenya	300
	Tanker 2	Kenya	300
Mkombozi	Chacha	Tanzania	600
	Kamongo	Tanzania	220
	Munanka	Tanzania	600
	Nyangi	Tanzania	350
	Wankyo	Tanzania	400
	Kirumba	Tanzania	300
	Matara	Tanzania	300
	Mugendi	Tanzania	300
	Other	Tanzania	500
Total			**8,280**

Developments

The following three developments that impact the Lake Victoria cargo transport sector have been identified through desktop research, a review of documentation, and stakeholder interviews:

- Termination of RVR concession contract – Due to RVR's failure to meet contractual obligations, Kenya and Uganda have recently started the process of terminating RVR's contract. In Kenya, the Nairobi High Court finalised the process by granting the order to terminate on the 31st of July 2017. Uganda expects to finalise the termination process by September of 2017. The termination of the RVR contracts entails that the rail and rail-wagon ferries revert to the URC and KRC in Uganda and Kenya, respectively.
- Revival and expansion of rail-wagon ferry system – Following from stakeholder consultations, MTBS understands that the URC aims to revive the rail-wagon ferry system. Thereto, the URC aims to procure design and construction works for a replacement vessel for the MV Kabalega shortly. Additionally, the URC stated that the Government of Tanzania (GoT), through the TPA and TRL, is willing to cooperate in the revival of the Lake Victoria link between Port Bell and Mwanza, as this may benefit the competitiveness of the Central Corridor route to Kampala.
- Potential for PPP in Ugandan Lake Victoria cargo transport activities – Following a meeting with the URC, MTBS has come to the understanding that the URC currently envsisions carrying out Port Bell operations and rail-wagon ferry operations itself. However, the URC is open to PPP structures being implemented.

1.5.3.2 Passenger Services

Current Situation

Similar to the cargo services, some passenger services were originally carried out by the rail corporations. Specifically, the Tanzanian MSCL operated several vessels on multiple long-range routes; the table below provides an overview of the MSCL's main passenger vessels and their respective conditions.

Table 1-5 MSCL Passenger Vessels

Vessel	Owner	Capacity		Routes Served	Status
		Passengers	Cargo (Tons)		
MV Serengeti	MSCL	593	350	Mwanza – Kemondo Bay – Bukoba; Mwanza – Nansio; Mwanza – Port Bell; Mwanza – Kisumu; Mwanza - Jinja	Operational
MV Victoria	MSCL	1,200	200	Mwanza – Kemondo Bay - Bukoba	Operational
MV Butiama	MSCL	200	100	Mwanza – Nansio	Operational
MV Clarias	MSCL	293	10	Mwanza - Nansio	Operational
MV Bukoba	MSCL	430	850	Mwanza - Bukoba	Sunk (1996)

Additionally, several short-range ferry services are provided. In Uganda, such short-range ferries are provided by the Uganda National Roads Authority (UNRA), as these ferry links are perceived to be an extension of the roads. Currently, UNRA provides high-frequency free services on the Nakiwogo – Kyanvubu and Kiyindi – Buvuma links.

The ferries used for these services are very simple pontoon barges with ramps on either side, as depicted in the figure below. It is noted that these ferries are typically used for small river crossings and are not considered adequate for a lake of the size of Lake Victoria, although the Nakiwogo – Kyanvubu route is short and reasonably sheltered.

Additionally, the ferries are in a poor condition and often suffer from failures, resulting in reduced connectivity as the ferries are sent for repairs.[1]

Figure 1.14 UNRA Nakiwogo to Kyanvubu Ferry

[1] Kiyindi ferry is damaged and taken out of operation for maintenance: http://www.chimpreports.com/unra-halts-kiyindi-ferry-services/

Besides the two routes discussed above, UNRA provided ferry services between Bukakata (Masaka) and Luku (Bugala island, Kalangala) and between Nakiwogo (Entebbe) and Lutuboka (Bugala island, Kalangala) to connect people from Bugala island to Uganda's mainland. However, as the provided Government-operated ferry services were considered inadequate in terms of connectivity and quality, the GoU decided to employ PPPs as a means to improving the services.

First, Kalangala Infrastructure Services (KIS) was contracted to service the Bukakata – Luku route in 2008 (an elaboration and discussion of this contract is provided in section 7.3.2). Consequently, the MV Pearl was launched in August of 2012 to replace the UNRA ferry on this route. Through deploying a newer and faster vessel, the travel time between Bukakata and Luku was cut from 60 to 30 minutes and the annual number of crossings was increased from 2,000 with the UNRA ferry to 3,600 with the MV Pearl in 2014. In 2015, the MV Ssese was added to this route by KIS to ensure continuity of the services and increase the potential number of crossings. This resulted in a further increase in the number of crossings to over 5,000 in 2015. In contrast to the 2 current UNRA services, the Bukakata – Luku ferry service was initially a paid service, with a one-way passenger fee of UGX 3,500. However, as locals argued that this service was a necessary extension of the roads that enables living on the islands, similar to the Kiyindi – Buvuma service, the passenger fee was removed.

Figure 1.15 KIS Bukakata to Luku Ferry - MV Pearl

Subsequently, the GoU signed a 1-year renewable management contract with National Oil Distributors in 2015 to operate the government-owned MV Kalangala, which plies a route between Nakiwogo (Entebbe) and Lutoboka (Bugala island, Kalangala). The Government had previously operated this vessel itself since its introduction in 2006.

Besides the government-operated routes and the PPP routes, the private company Earthwise ferries introduced its fiberglass catamaran ferry MV Amani in 2011. The ferry has a passenger capacity of 150 and has operated several routes; in 2012 and 2013, the ferry connected several of the Ssese islands (Bubeke, Bukasa, and Bufumira) to the Ugandan mainland at Kasenyi. Subsequently, in 2014, the MV Amani plied the Nakiwogo – Lutoboka route as the MV Kalangala was sent to Mwanza for repairs. However, it seems that the MV Amani is currently not operational.

In early 2015, Earthwise ferries launched its second catamaran ferry, the MV Bluebird. This second ferry was introduced to ply the Port Bell – Mwanza route; however, it seems that this second ferry is currently also not operational. During a site visit to Port Bell, the MV Bluebird was observed while idle at the port (see Figure 1.16). According to port stakeholders, it had not operated recently.

Figure 1.16 Earthwise Ferries - MV Bluebird

The table below provides an overview of private operators (excluding wooden boat operators) that provide passenger services on the Ugandan side of Lake Victoria. More detailed information on the contractual responsibilities and agreements for the operational ferry service operators is provided in section 7.3.

Table 1-6 Current Private Involvement in Lake Victoria Passenger Transport

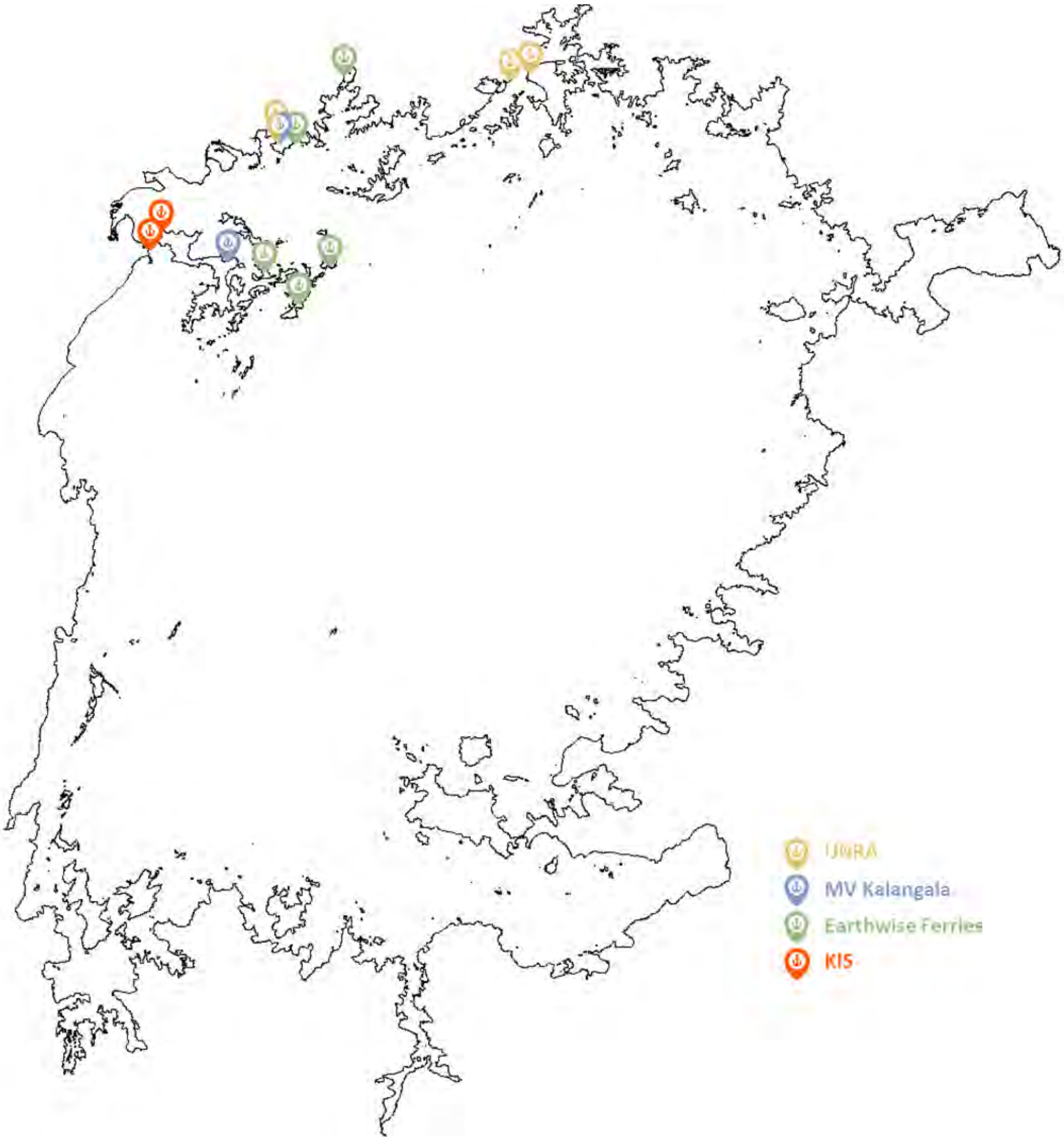
Operator	Services	Vessels (Vessel Type)
National Oil Distributors	Nakiwogo (Entebbe) – Lutoboka (Kalangala island)	MV Kalangala (RoPax)
Kalangala Infrastructure Services	Bukakata (mainland Uganda) – Luku (Kalangala island)	MV Ssese (RoPax); MV Pearl (RoPax)
Earthwise Ferries*	Kalangala – Kasenyi; Nakiwogo (Entebbe) – Lutoboka (Kalangala island)**; Port Bell - Mwanza	MV Amani (catamaran ferry); MV Bluebird (catamaran ferry)

*Currently not operational

**Earthwise ferries plied the Nakiwogo – Lutoboka route during the period that MV Kalangala was in Mwanza for repairs

Subsequently, Figure 1.17 provides an overview of all the landing sites that are served by all the discussed ferry services. It is however noted that the Earthwise ferries are not operational.

Figure 1.17 Landing Sites Served by Passenger Ferries



Developments

From stakeholder consultations, it has been identified that UNRA envisions developing a new ferry service between Lugala and the Sigulu islands, in the Eastern regions of the Lake. Thereto, UNRA has contracted the Danish firm JGH Marine A/S to design and construct the ferry. It is expected that the construction works will be completed in H2 of 2018.

1.5.4 Lake Transport Issues

This section elaborates on several key issues hampering development of the Lake Transport system, as identified from, inter alia, the following sources:

- Kisumu Port PPP Feasibility Study (2016).
- Building a Reform Consensus for Integrated Corridor Development in the East African Community: Pillar 1 – A Strategy and Action Plan for Intermodal Development (2014).
- Pre-Feasibility Study for Kisumu Port (2012).
- Stakeholder discussions.

Poor access infrastructure to the lake ports

Port Bell and the port of Jinja are connected to the Mombasa – Kampala main railway line (meter gauge). The port of Kisumu is also connected to this line, albeit through a branch line. However, all three of the rail connections are currently not functioning, as the rail and lake services were deemed uneconomic by the private concessionaire RVR, and were thus halted. Subsequently, encroachment issues arose as people started building houses on the derelict rail line. On the southern side of the lake, the port of Mwanza South is connected to the central corridor meter gauge rail network. Musoma port has no railway connection, but there is a railway track within the yard area to load/offload and shunt rail wagons. The other ports are only accessible by roads, which are typically in a poor condition.

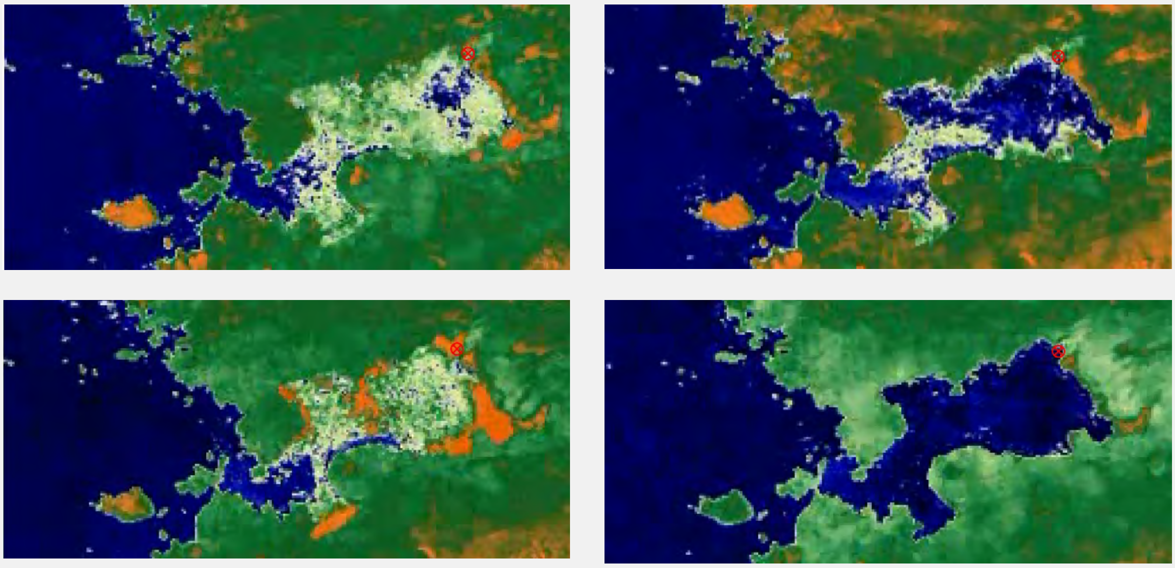
Competition from improved accessibility of the towns around the lake is undermining the transport services on the lake

The road network around Lake Victoria has gradually developed, through capacity and quality improvements of the highways and the introduction of more efficient One Stop Border Posts (OSBPs). The continuous improvement of the roads has reduced the competitive position of the transport services on the Lake on some routes. Additionally, the SGR projects in Kenya may further undermine the competitiveness of lake transport in the long term, as the SGR will provide a direct rail connection between the port of Mombasa and Kampala.

Regular services are required at all ports to ensure accessibility

Sedimentation in the lake results in a periodic need for regular dredging at nearly all ports on the lake. Additionally, water-hyacinth and "floating islands" periodically clog up the ports, hampering the movement of vessels in and out of the ports. The figure below presents a time-lapse of the water hyacinth in the Kavirondo Gulf (Kisumu) between 2000 and 2013, where the water hyacinth issues are most severe.

Figure 1.18 Satellite Images of Water Hyacinth Development in the Kavirondo Gulf



Adequate infrastructure and equipment are not available or dilapidated

None of the ports on Lake Victoria has container handling equipment. Generally, the existing port infrastructure is outdated and in poor condition, as the breakup of the EARHC in 1977 resulted in a decline in investments in infrastructure. Additionally, as adequate cargo handling equipment is lacking in the ports, all handling operations are carried out through manual labour, for which day labourers are hired directly by the vessel owner or cargo owner.

Lake navigability and maritime safety are not yet sufficiently addressed

While all registered ships on Lake Victoria are provided with radio communication systems, none of the lake ports is provided with formally structured maritime assistance services of any kind. This implies that no general weather synopsis, storm or other navigational warnings are given to ships departing from any of the lake ports. The Lake Victoria Basin Commission Secretariat, in partnership with the EAC Partner states, is planning a Maritime Rescue Coordination Centre in Mwanza North, funded by the African Development Bank. The plots have been already acquired. Aids to navigation were installed and surveys have been made at the ports of Mwanza, Kisumu and Port Bell, though navigational charts are not publicly available. Besides the lack of the marine assistance services, the lake lacks landfall lights, beacons, buoys, leading lines or other facilities that delineate headlands, ship routes, known dangers (including wrecks) or the fairways and approaches to ports.

Global best practice systems are not perfectly imitable on Lake Victoria

Similar areas include the coastal waters of the Baltic, Adriatic, and Aegean seas. These areas all envelop a multitude of islands, thus resulting in the need for short to medium range passenger and cargo ferry systems, similar to the Lake Victoria case. However, as Lake Victoria is not directly accessible from the Sea, importing vessels poses an issue. Additionally, the lake ports lack large shipbuilding facilities, thus limiting the size of vessels that can be constructed at the ports; it is noted that the Chinese firm Mango Tree Group has developed a large shipbuilding facility at a site in Kawuku (Wakiso district), therewith counteracting the construction limitations on Lake Victoria (see Figure 1.19). However, due to a lack of specialised shipbuilding capabilities, high-end vessels still need to be constructed abroad. Vessels can subsequently be disassembled and transported to Lake Victoria, where they can be reassembled; this elaborate process results in increased costs of introducing new vessels, thus negatively impacting viability of projects. These challenges limit the imitability of implemented network solutions of otherwise similar cases.

Need for an integrated and harmonious lake transport development plan

It is imperative that development plans are carried out at the lake level. As the lake presents a closed transport system, developments in one port will need to be implemented in parallel to similar developments in the other lake ports to become successful. Additionally, there should be a focus on key projects; introduction of new competing large-scale port projects, such as Bukasa port, may reduce the viability of the development of the current ports. Hence, such projects may substantially reduce private sector appetite for becoming involved in developing the current ports.

Domestic passenger traffic

The passenger and vehicle transport between the islands and the mainland requires a proper solution. There are over 200 landing sites, which are mainly used for fishing and market activities. The majority of these sites lack basic facilities and adequate hinterland connections. In order to serve the passenger flows between the islands and the mainland, ferry services should be introduced on several strategic high-volume routes. The development of these services should be accompanied by the development of facilities and hinterland connections.

Figure 1.19 Mango Tree Kawuku Shipyard

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2 Trade & Market

Summary

Section 2 provides an overview of Uganda's main imports and exports, and further investigates the Lake Victoria transport potential of several of the country's major import and export commodities.

<u>Trade Overview</u>

Overall, it can be observed that Uganda has a substantial trade deficit; in 2015, total export volumes amounted to 2.5 M tons, whereas import volumes amounted to 6.7 M tons. However, it is noted that exports have grown more rapidly than imports; exports grew at an average annual rate of 13.99%, whereas imports grew at an average annual rate of 11.34%

In terms of imports, the 2015 top 3 import commodities (4-digit HS96 codes) comprised petroleum products (1.5 M tons), ready cement (1.4 M tons), and wheat and meslin (0.5 M tons). In terms of exports, the top 3 included ready cement (0.4 M tons), maize (0.3 M tons), and coffee (0.2 M tons).

<u>Market Overview</u>

For the purpose of selecting high potential commodities for Lake Victoria trade, commodity groups were assessed based on (i) current volumes; (ii) expected growth potential; (iii) location of the activities; and (iv) ease of transporting the commodities over the lake. Consequently, the following high potential commodity groups have been included in the market assessment:

- Mineral Resources
- Cement
- Oil & Gas
- Iron & Steel

The table below provides an overview of the developments in these sectors, and their impact on the potential Lake Victoria volumes.

Development	Lake Victoria Transport Impact	Impact
Mineral Resources		
Mining sector in Uganda is growing rapidly	Increased transport of inputs and outputs	+
Majority of natural resources are in Uganda's western regions	Lake Victoria is conveniently situated to connect the mines in Uganda's western regions to Mombasa (Kenya) or Dar es Salaam (Tanzania).	+
Overall Lake Victoria transport potential	*It is expected that both mining inputs, such as coal, and outputs, comprising several types of mineral resources, will increase substantially and present a substantial opportunity for lake transport.*	+
Cement		
Cement demand is growing rapidly throughout the EAC	Increased transport of inputs and outputs	+
Expansion of cement production capacity.	Development of large-scale integrated cement production facilities may result in a decreased reliance on imported cement from Global markets. As such, cement import volumes may dwindle.	−
Expansion of cement production capacity.	If Uganda's production levels exceed national demand, excess cement may be exported to Rwanda and Burundi, which lack adequate production capacity. This may result in increased exports from Uganda's eastern regions towards Burundi and Rwanda, which can be transported over the lake from Jinja to Bukoba.	+

Expansion of cement production capacity.	Increased production levels result in an increased for inputs such as coal. As the majority of new cement facilities are to be developed in Eastern Uganda, coal imports will likely be transported from Mombasa by rail or road; however, inputs that are imported through Dar es Salaam may be transported over the lake, from Mwanza to Jinja.	+
Overall Lake Victoria transport potential	*It is expected that imports of ready cement will dwindle, as regional cement production capacity expansions outpace cement demand growth. However, potential cement exports to Burundi and Rwanda, overall strong cement demand growth in the region, and an increased need for input materials are expected to compensate for the decrease in imports. Hence, the identified cement sector developments result in a substantial opportunity for Lake Victoria transport.*	+
Oil & Gas		
Development of refining capacity in Uganda	Reduced imports of petroleum products	−
Development of oil and gas exploitation in western regions of Uganda	Potential for exports to Global markets. As the majority of oil and gas reserves are in the western regions of Uganda, exports can be transported through Lake Victoria to the regional seaports of Mombasa and Dar es Salaam. In the long term, once the envisioned export pipeline is developed, export volumes over the lake may dwindle.	+
Development of oil and gas exploitation in western regions of Uganda	The development of oil-related facilities in Uganda results in imports of project cargoes. Such project cargoes often include large and heavy structures, which can damage roads and can thus be transported over the lake.	+
Overall Lake Victoria transport potential	*It is expected that imports of petroleum products will decrease, as regional oil recovery and refining capacity developments are implemented in the short to medium term. However, potential cement exports to Global markets and the need for construction materials and other project cargoes are expected to compensate for the decrease in imports. Hence, the identified oil & gas sector developments result in a substantial opportunity for Lake Victoria transport.*	+
Iron & Steel		
Implementation of "Buy Uganda, Build Uganda" policy	Reduced steel product imports, as an increasing share of national demand can be satisfied through local production. Due to lagging quality of regional steel products, as compared to Global steel products, it is not expected that products in excess of local demand will be exported to Global markets.	−
Implementation of "Buy Uganda, Build Uganda" policy	Increased coal requirements to increase local steel production levels. As many of the steel manufacturers are situated close to Kampala or Jinja, the inputs can be efficiently transport over Lake Victoria.	+
Overall Lake Victoria transport potential	*It is expected that potential Lake Victoria transport volumes resulting from iron & steel sector activities will not grow substantially, due to the expected fall in import volumes.*	+
Transit Containers		
Development of the SGR between Mombasa and Kampala	The ongoing SGR development may undermine the competitive position of the Lake Victoria route once the connection between Mombasa and Kampala is completed.	−
Rapid growth of transit container volumes from/to Uganda	Lake Victoria is conveniently situated to accommodate the growing transit container volumes between Mombasa/Dar es Salaam and Uganda, as Uganda's main consumption/production centres are located along the shores of the lake.	+
Development of the Lake Victoria transport system	The envisioned improvements to the Lake Victoria transport system will enable cost-efficient transport of the transit containers, thus improving the competitiveness of lake transport vis-à-vis road and rail.	+
Overall Lake Victoria transport potential	*The substantial volumes and rapid growth of transit container flows provide a large opportunity for the lake transport system. However, it should be noted that market share for lake transport will likely decrease substantially once a direct SGR connection between Mombasa and Kampala is in place.*	+

2.1 Trade Overview

2.1.1 Imports

The table below provides an overview of Uganda's imports. The following observations can be made:

- Trade data for the years 2000 and 2015 has been extracted from the UN Comtrade Database. In order to ensure comparability of the data, data for both years was extracted in the the 1996 Harmonized Commodity Description and Coding System (HS) format.
- The table presents data on the 10 largest 2-digit commodity groups in 2015, out of 97 commodity groups reported in the UN Comtrade Database. In 2015, these 10 commodity groups accounted for 81.37% of Uganda's total imports in terms of volume; in terms of value, these commodities accounted for 52.62% of total imports. In 2000, the same commodity groups accounted for 81.66% in terms of volumes, and 48.75% in terms of value.
- In 2015, the commodity group including salt, sulphur, stone, lime, and cement (HS96 2-digit code 25) was Uganda's largest import commodity group, amounting to a total of 1.6 M tons; in relative terms, the commodity group contributed 24.54% of total imports. In 2000, the same commodity group was ranked second in terms of import volumes, with a volume of 0.2 M tons (16.78% of total imports in 2000). Hence, it is concluded that the commodity group has become a larger contributor to total imports, both in relative and absolute terms. Within the commodity group, ready cement is the largest contributor, with a 2015 volume of 1.4 M tons.
- The mineral fuels and mineral oils commodity group (HS96 2-digit code 27) was ranked second in terms of import volumes in 2015, with a total volume of 1.6 M tons. Within this commodity goup, petroleum products was the largest contributor, with a volume of 1.5 M tons.
- In 2015, the top 3 import commodities (4-digit HS96 codes) comprised petroleum products (1.5 M tons), ready cement (1.4 M tons), and wheat and meslin (0.5 M tons).
- The column "2015 rank" presents the relative importance of import commodity groups in 2015. Additionally, a green font indicates that the commodity group has increased in importance rank compared to 2000; a red font indicates that the commodity group has decreased in importance rank compared to 2000; and a black font indicates that the importance rank of a commodity group has remained constant between 2000 and 2015.
- The top 10 commodity groups in 2015 and 2010 have remained fairly constant; every commodity group except for plastics (HS96 2-digit code 39) and vehicles (HS96 2-digit code 87) are represented in the top 10 commodity groups in both 2000 and 2015.

Table 2-1 Trade Overview - Uganda Imports

HS96 Commodity Group	Volume (Tons)					Value (USD)	
	2015	2015 Rank	2000	2000 Rank	CAGR (%)	2015	2000
25: Salt; Sulphur; Stone; Lime; Cement	1,641,009	1	223,889	2	14.20%	128,358,275	26,776,626
27: Mineral Fuels and Mineral Oils	1,633,660	2	437,712	1	9.18%	1,032,031,886	165,678,585
10: Cereals	599,135	3	135,490	3	10.42%	177,893,569	42,024,631
72: Iron and Steel	478,503	4	65,003	5	14.23%	279,557,234	34,111,500
15: Animal and Vegetable Oils	282,179	5	45,024	6	13.02%	210,122,371	25,838,653
39: Plastics and Plastic Articles	198,276	6	22,279	11	15.69%	286,512,100	26,859,235
87: Vehicles	179,484	7	16,971	13	17.03%	530,663,320	87,140,315
17: Sugars and Sugar Confectionery	173,959	8	71,388	4	6.12%	102,799,535	22,922,792
48: Paper and Paperpulp Articles	134,586	9	34,319	9	9.54%	129,070,245	28,937,427
69: Ceramic Products	119,672	10	37,168	8	8.11%	31,715,408	4,717,939
Other	1,245,525		244,695		11.46%	2,619,393,181	488,916,277
Total	**6,685,988**		**1,333,939**		**11.34%**	**5,528,117,124**	**953,923,980**

2.1.2 Exports

The table below provides an overview of Uganda's exports. The following observations can be made:

- Trade data for the years 2000 and 2015 has been extracted from the UN Comtrade Database. In order to ensure comparability of the data, data for both years was extracted in the the 1996 Harmonized Commodity Description and Coding System (HS) format.
- The table presents data on the 10 largest 2-digit commodity groups in 2015, out of 97 commodity groups reported in the UN Comtrade Database. In 2015, these 10 commodity groups accounted for 74.77% of Uganda's total imports in terms of volume; in terms of value, these commodities accounted for 51.99% of total imports. In 2000, the same commodity groups accounted for 72.24% in terms of volumes, and 51.91% in terms of value.
- Overall, a substantial trade deficit can be identified; in 2015, total export volumes amounted to 2.5 M tons, whereas import volumes amounted to 6.7 M tons. However, it is noted that exports have grown more rapidly than imports; exports grew at an average annual rate of 13.99%, whereas imports grew at an average annual rate of 11.34%.
- Similar to the imports, the commodity group including salt, sulphur, stone, lime, and cement (HS96 2-digit code 25) was Uganda's largest import commodity group in 2015. However, in terms of absolute volumes, the exports only amounted to 0.4 M tons, against the 2015 import volume of 1.6 M tons. In relative terms, the commodity group contributed 16.72% of total exports in 2015. Similar to imports, the largest export contributor within the commodity group is ready cement, with a 2015 volume of 0.4 M tons.
- The cereals commodity group (HS96 2-digit code 10) was ranked second in terms of import volumes in 2015, with a total volume of 0.4 M tons. Within this commodity goup, maize (corn) was the largest contributor, with a volume of 0.3 M tons.
- In 2015, the top 3 export commodities (4-digit HS96 codes) comprised ready cement (0.4 M tons), maize (0.3 M tons), and coffee (0.2 M tons).
- The column "2015 rank" presents the relative importance of import commodity groups in 2015. Additionally, a green font indicates that the commodity group has increased in importance rank compared to 2000; a red font indicates that the commodity group has decreased in importance rank compared to 2000; and a black font indicates that the importance rank of a commodity group has remained constant between 2000 and 2015.
- In contrast to the import portfolio, Uganda's export portfolio has changed substantially between 2000 and 2015; 5 of the 2015 top 10 commodity groups were not represented in the top 10 commodity groups in 2000. Most notably, cement exports were ranked 24th in 2000 and rose to rank 1 in 2015, in terms of volumes. Additionally, sugar and animal food have substantially increased in importance in Uganda's export portfolio.

Table 2-2 Trade Overview - Uganda Exports

HS96 Commodity Group	Volume (Tons)					Value (USD)	
	2015	2015 Rank	2000	2000 Rank	CAGR (%)	2015	2000
25: Salt; Sulphur; Stone; Lime; Cement	419,610	1	715	24	53.96%	85,195,763	203,698
10: Cereals	378,092	2	9,797	8	27.58%	104,283,176	3,230,396
9: Coffee, Tea, and Spices	274,103	3	178,555	1	2.90%	477,738,013	165,060,749
7: Vegetables	192,229	4	25,555	3	14.40%	79,636,805	4,991,018
27: Mineral Fuels and Mineral Oils	130,494	5	25,750	2	11.43%	149,045,438	28,387,988
17: Sugars and Sugar Confectionery	109,651	6	1,886	17	31.11%	56,169,356	794,629
23: Food Industries; Animal Feed	99,066	7	524	27	41.83%	16,117,614	89,593
72: Iron and Steel	95,984	8	2,327	14	28.14%	86,596,641	1,314,726
11: Milling Industry Products	95,875	9	5,086	10	21.62%	44,859,049	1,334,304
15: Animal and Vegetable Oils	81,047	10	4,130	11	21.95%	79,066,157	3,709,887
Other	633,219		97,738		13.27%	1,088,265,861	193,706,537
Total	**2,509,370**		**352,063**		**13.99%**	**2,266,973,873**	**408,823,525**

2.2 Market Overview

This section presents a market assessment. The assessment focuses on several key commodity groups, which possess one or multiple of the following characteristics:

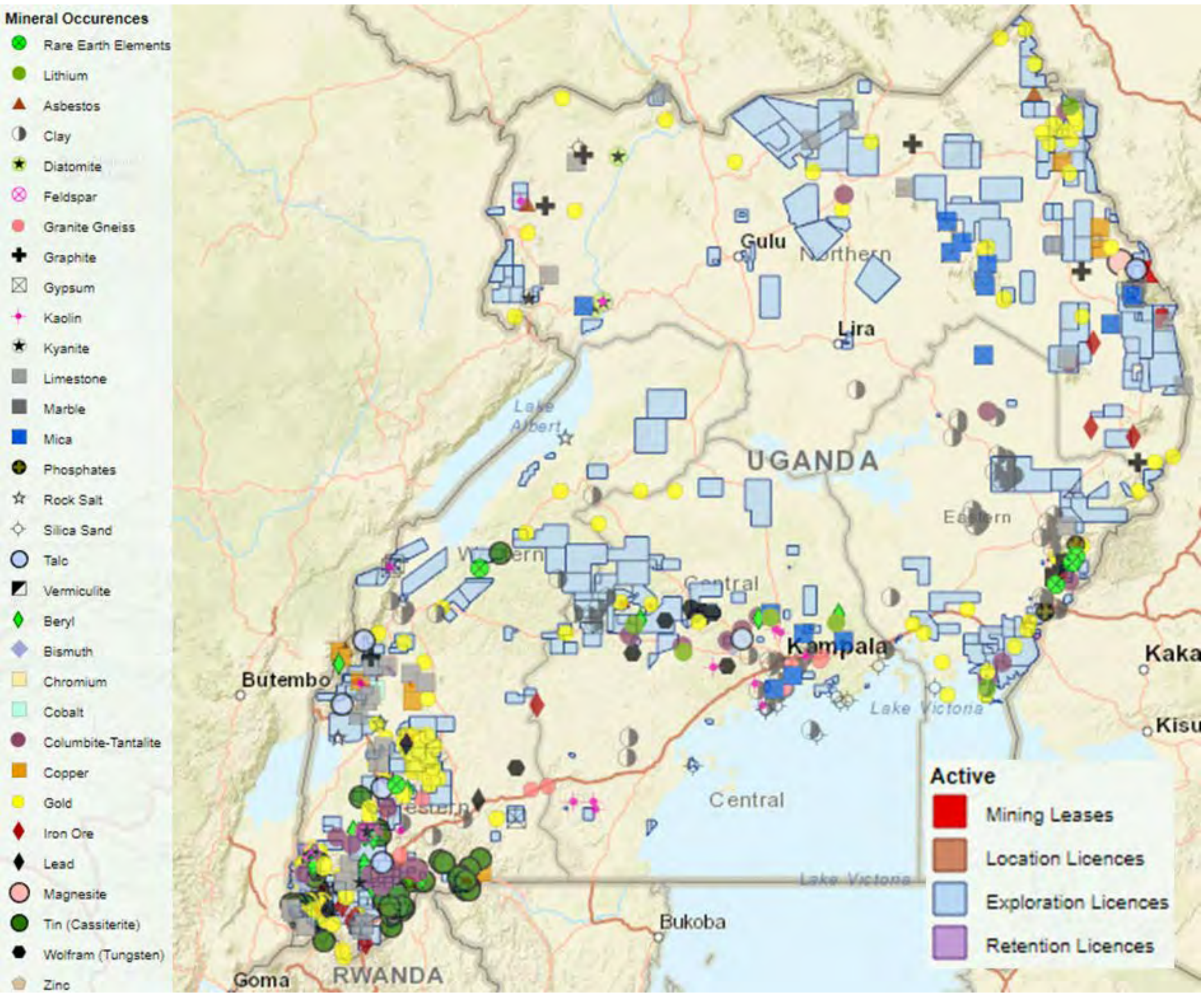
- Adequate current volumes – The commodity has substantial import or export volumes, as identified in section 2.
- Substantial growth potential – Based on ongoing and planned developments, it is expected that volumes of the commodity group will increase substantially.
- Convenient location – The activities for the commodity group are situated mainly in the Western and Southern regions of Uganda, as these regions are most efficiently connected through the Lake transport system.
- Commodities are easily transported by vessel – Commodities that can be efficiently transported over the lake include dry bulk and general cargo. If a RoRo vessel system is implemented, nearly all commodities can be transported over the lake in an efficient manner.

2.2.1 Mineral Resources

Current Situation

The mineral resources sector in Uganda is mainly situated in the Western regions of the country, as can be observed from the figure below. The mineral deposits mainly comprise gold, iron ore, wolfram, tin, bismut, beryl, limestone, and columbite.

Figure 2.1 Market Overview - Mineral Resources Overview



Subsequently, Figure 2.2 and Table 2-3 provide a more detailed overview of the current mining activities in Western Uganda. Figure 2.2 provides an overview of the mining licenses that are currently active in the region; Table 2-3 presents further details on the mining licenses indicated on the map.

Figure 2.2 Market Overview - Mining License Overview

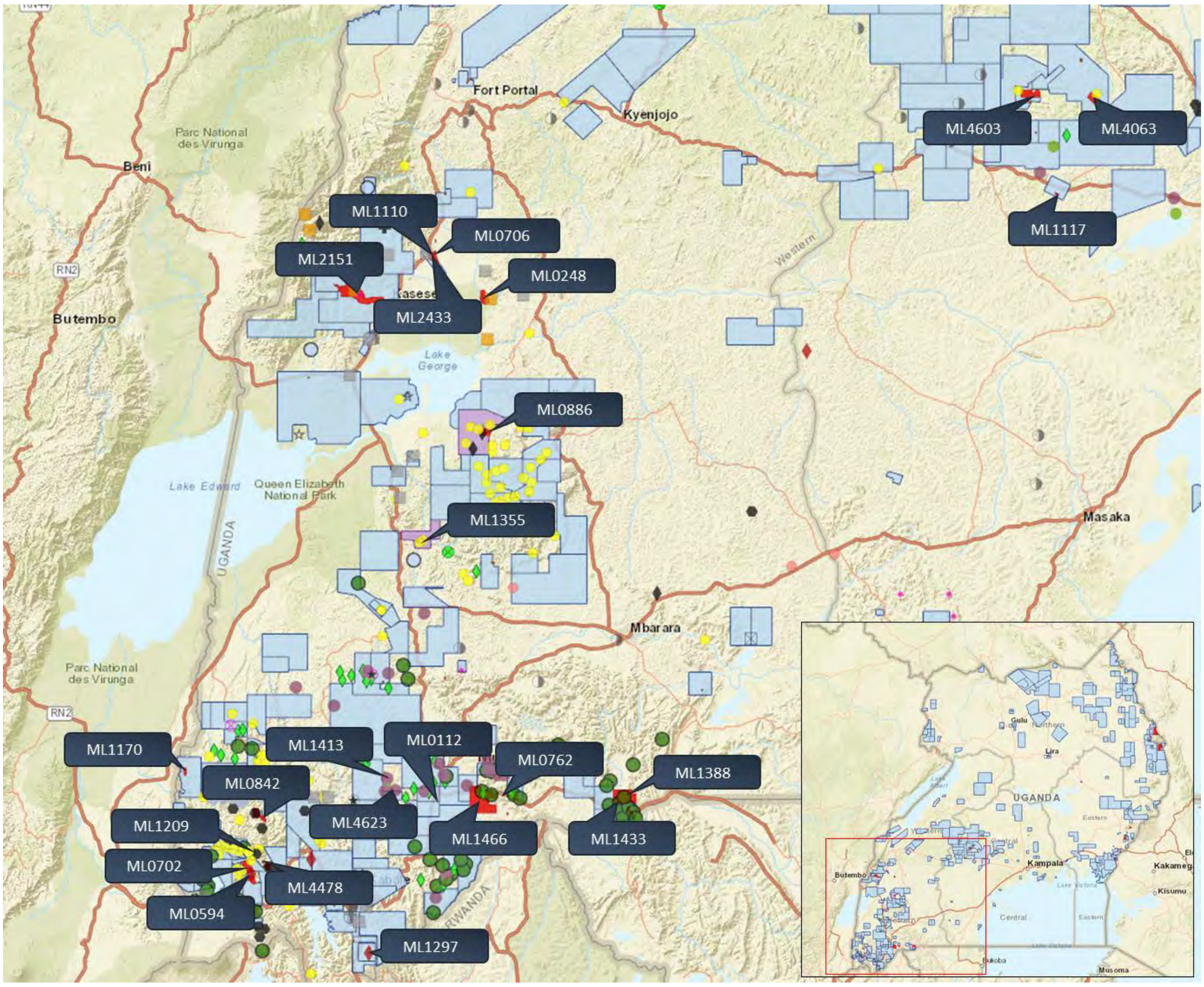


Table 2-3 Market Overview - Mining Licenses

Licence #	Company	Date Granted	Expiry Date	Commodities	Area (ha)
ML0706	Hima Cement Ltd	01/12/2010	30/11/2031	Limestone	54.11
ML1110	Hima Cement Ltd	04/09/2012	12/03/2034	Limestone	412.21
ML2433	Tibet Hima Mining Co Ltd	08/08/1997	07/08/2018	Limestone	34.53
ML0248	Hima Cement Ltd	02/10/2007	01/10/2028	Limestone	536.39
ML2151	Tibet Hima Mining Co Ltd	01/01/1974	31/12/2017	Base Metals	3,249.47
ML0886	Shaft Sinkers Limited	28/10/2011	27/10/2032	Gold; Lead	451.31
ML1355	Sino Minerals Investments Company Ltd	15/09/2014	14/09/2035	Base Metals; Gold	9.89
ML1388	Sun and Sand Mines and Minerals Ltd	29/10/2014	28/10/2035	Tin	2,000.00
ML1433	African Panther Resources Ltd	02/02/2015	01/02/2036	Base Metals; Cassiterite; Gold; Silver	200.20
ML0762	Zarnack Holdings Ltd	17/05/2011	16/05/2032		202.20
ML1466	Euro Minerals Ltd	15/04/2015	14/04/2036	Cobalt; Tin	4,000.00

Licence #	Company	Date Granted	Expiry Date	Commodities	Area (ha)
ML0112	V.E.K. Global Mining Ltd	06/04/2006	05/04/2027		15.34
ML4623	Marubeg Company Ltd	15/08/2003	14/08/2024		12.42
ML1413	BNT Mining Ltd	18/12/2014	17/12/2035	Tantalite	27.39
ML1297	Sino Minerals Investments Company Ltd	14/03/2014	13/03/2035	Iron Ore	4.49
ML0594	Kigezi Steel Company Ltd	13/06/2011	12/06/2032	Iron Ore	306.17
ML4478	Krone Uganda Ltd	08/02/1999	07/02/2035	Wolfram	176.78
ML0702	Great Lakes Iron and Steel Company Ltd	08/11/2010	07/11/2031	Iron Ore	452.50
ML1209	Sino Minerals Investments Company Ltd	15/11/2013	14/11/2034	Base Metals; Wolfram	3.24
ML0842	Berkeley Reef Ltd	16/09/2011	15/09/2032	Wolfram	484.35
ML1170	Uganda International Mining Company Ltd	20/06/2013	19/06/2034	Iron Ore	105.52
ML1117	Building Majesties Ltd	19/04/2013	18/04/2032	Dimension Stone	47.20
ML4063	AUC Mining Ltd	03/01/1994	02/01/2030	Gold	580.68
ML4603	Kisita Mining Company Ltd	06/08/2002	05/08/2023	Gold	871.60

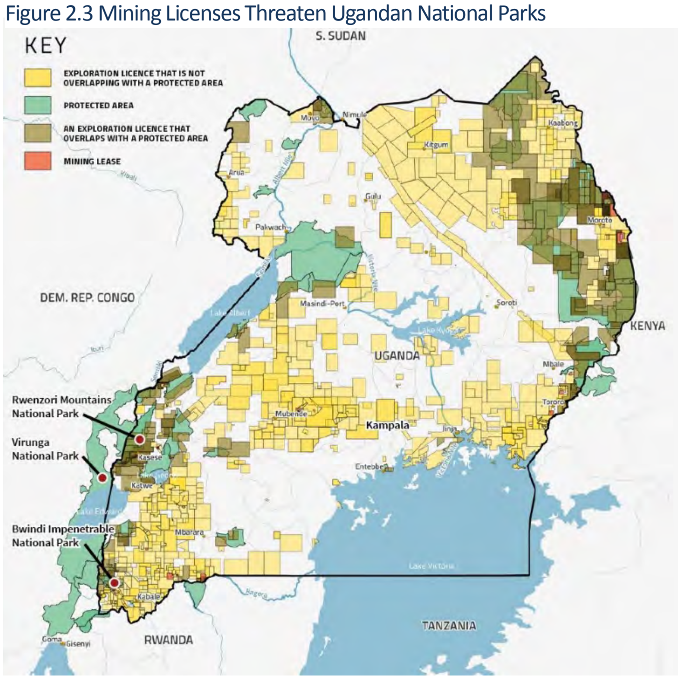
Developments

The mining sector in Uganda is growing rapidly, which can be observed from the amount of recently granted mining licenses and ongoing license applications (the light blue marked areas on the mining maps).

However, the mining sector is struggling with corruption, which may hamper development. Inter alia, Global Witness (2017) carried out an 18-month long study that led to the following discoveries:

- Miners are working in dangerous, largely unregulated conditions.
- The mining activities threaten the Bwindi and Rwenzori national parks, which house nearly half of the world's remaining mountain gorillas. This may also threaten Uganda's tourism industry.
- Suboptimal agreements result in Uganda being deprived of tax revenues.
- Minerals from the Democratic Republic of Congo (DRC) and South Sudan, which may be used to fund conflict and human rights abuses, pass through Uganda on their way to international markets.

Figure 2.3 Mining Licenses Threaten Ugandan National Parks



In line with these findings, the President of Uganda has recently cancelled a USD 175M copper mining contract between the GoU and Tibet Hima Mining Co, a subsidiary of the Chinese automobile producer Tibet Automobile, due to alleged bribes that influenced the outcome of the contract award.

Lake Victoria Transport Potential

- The development of the mining sector in the could substantially boost potential Lake Victoria transport volumes, as the mining output will likely be exported and the mining companies require coal and other imported materials as inputs in their mining process.
- the majority of natural resources are situated in the Western region of Uganda, towards which Lake Victoria can provide an efficient connection.

2.2.2 Cement

Current Situation

As identified in section 2.1, cement is one of Uganda's main trading commodities, both in terms of imports and exports. The increasing importance of cement in the EAC can be attributed to the rise in infrastructure development, resulting in cement consumption growth outpacing production growth. In Kenya, for instance, cement demand grew at an average rate of 13.4% per annum between 2009 and 2015; in Uganda, cement demand has experienced a sustained growth of 10% per annum.

Currently, the EAC has an installed cement production capacity of 17.5 mtpa, with Kenya providing approximately 50% of installed capacity. Uganda provides approximately 3.0 mtpa of installed production capacity. Due to the strong demand growth, production levels are nearing the installed capacity. The table below presents a summary of current clinker and cement capacity and production levels in the EAC countries. Subsequently, Figure 2.4 and Table 2-5 provide a more detailed overview of the current cement plants in the EAC.

Table 2-4 Cement - Current EAC Production Capacity

Country	Clinker Capacity (Mtpa)	Cement Capacity (Mtpa)	Cement Production (Mtpa)	Market Share (%)
Kenya	3.18	8.60	6.50	51.18%
Tanzania	1.87	4.90	3.30	25.98%
Uganda	0.86	3.00*	2.10	16.54%
Rwanda	0.07	1.00*	0.80	0.00%

*Estimated

Figure 2.4 Cement - EAC Cement Plant Locations

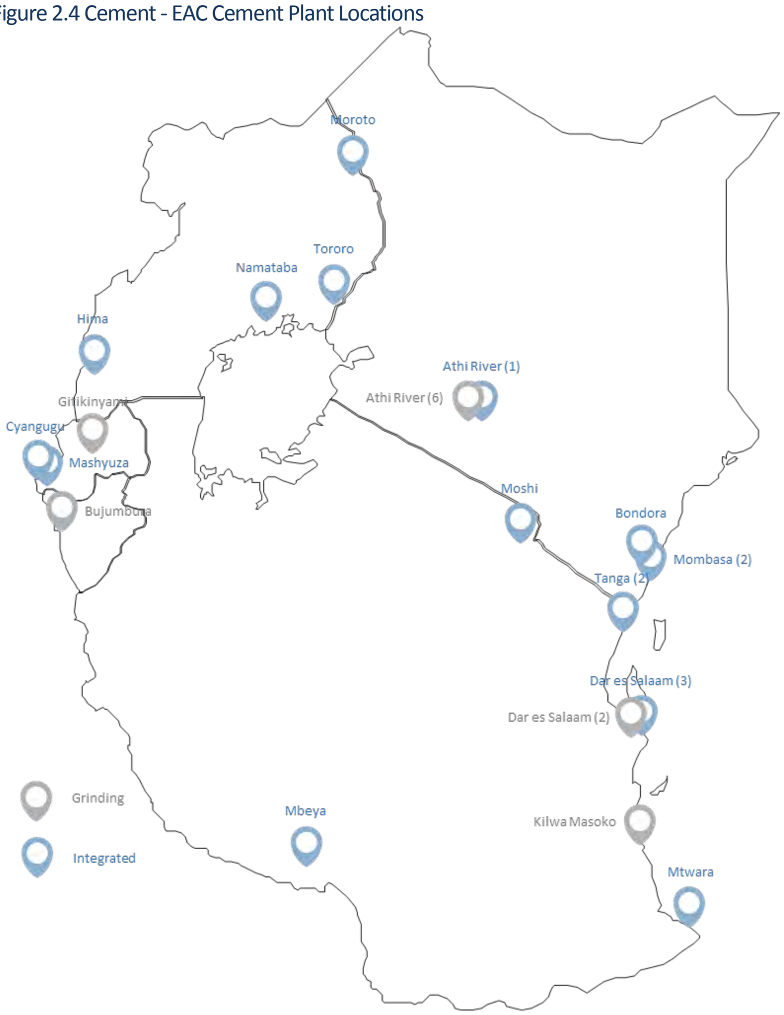


Table 2-5 Cement - EAC Cement Plant Locations and Owners

City	Facility Type	Facility Name	Company	Cement Capacity
Uganda				
Namataba	Integrated	Namataba	Kampala Cement	
Moroto	Integrated	Moroto	Moroto Cement	
Tororo	Integrated	Tororo	Tororo Cement Ltd	1.8 mtpa
Hima	Integrated	Hima	Hima Cement Ltd	0.9 mtpa
Tanzania				
Dar es Salaam	Grinding	Mbagala Grinding	Camel Cement Company	
Dar es Salaam	Integrated	Mbagala Integrated	Camel Cement Company	
Dar es Salaam	Grinding	Dar es Salaam	ARM Cement Ltd Tanzania	
Dar es Salaam	Integrated	Kimbiji	Lake Cement Ltd	
Dar es Salaam	Integrated	Wazo Hill	Tanzania Portland Cement Company Ltd	
Tanga	Integrated	Tanga ARM	ARM Cement Ltd Tanzania	1.5 Mtpa
Tanga	Integrated	Pongwe	Tanga Cement Plc	
Mtwara	Integrated	Mtwara	Dangote Industries (Tanzania) Ltd	3.0 Mtpa
Kilwa Masoko	Grinding	Lindi	Lee Building Materials Ltd	
Mbeya	Integrated	Mbeya	Lafarge Tanzania	
Kenya				
Athi River	Integrated	Athi River	East Africa Portland Cement Co	
Athi River	Grinding	Athi River	ARM Cement Kenya	
Athi River	Grinding	Athi River	National Cement Co Ltd	
Athi River	Grinding	Athi River	Savannah Cement	
Athi River	Grinding	Athi River	Mombasa Cement	
Athi River	Grinding	Ndovu	Karsan Ramji & Sons Ltd	
Athi River	Grinding	Athi River Bamburi	Bamburi Cement Ltd	1.0 Mtpa
Mombasa	Integrated	Mombasa	Bamburi Cement Ltd	
Mombasa	Integrated	Vipingo	Mombasa Cement	
Bondora	Integrated	Kaloleni	ARM Cement Kenya	
Burundi				
Bujumbura	Grinding	Bujumbura	Burundi Cement Company	
Rwanda				
Cyangugu	Integrated	Cyangugu	Mashyuza Cement	
Mashyuza	Integrated	Bugarama	Ciments du Rwanda Ltd	0.6 Mtpa
Gitikinyami	Grinding	Gitikinyami	ARM Cement Kenya	

Developments

The following EAC cement developments have been identified:

- Kenya
  - Nigerian based Dangote Cement aims to develop two 1.5 mtpa cement plants near Nairobi and Mombasa. However, the envisioned development has been pushed back to 2020/2021, due to the current foreign exchange crisis in Nigeria.

- For the first time in a decade, the possibility of a year-on-year cement consumption decline looms. In the first 5 months of 2017, consumption amounted to 2.50 mtpa, against 2.56 mtpa in the same period in 2016. However, the decline, which can be attributed to the completion of the first phase of the Kenyan SGR, is expected to be reversed once the second phase of the SGR development commences.
- East Africa Portland Cement Co aims at expanding its current facility, as well as investing in a Greenfield facility.
- Cemtech, a subsidiary of India's Sanghi Group, announed plans to develop a USD 131M cement factory in West Pokot County, in the Rift Valley region.

- Uganda
    - Cement production capacity is scheduled to be expanded substantially to cater to public sector infrastructure developments, such as the SGR (estimated at 800,000 tons of cement) and expected oil & gas sector developments. The majority of the scheduled cement factory developments are situated near Tororo, as Uganda's remaining large-scale limestone deposits are situated in the Northeastern region of the country.
    - Kenya-based Simba cement plans to develop a grinding plant in Nyakesi village, along the Tororo – Mbale highway, by the end of 2017. The plant will have a grinding capacity in excess of 1.0 mtpa.
    - In 2018, Hima cement envisions starting operations at a new USD 40M facility in Nyakesi, near Simba Cement's Tororo plot. This will increase Hima Cement's production capacity in Uganda from 0.9 mtpa to 1.9 mtpa.
    - Tororo Cement aims to expand the production capacity at its Tororo facility from the current 1.8 mtpa to 3.0 mtpa, through a USD 50M investment.
    - China National Materials Group (Sinoma) has plans to build a USD 500M cement plant in Mbale Industrial Park.
    - Kenya-based National Cement is developing a USD 184.5M cement plant in Mbale, with a 1 mtpa capacity.
- Rwanda
    - Prime Cement, a new entrant in the cement sector, aims to develop a USD 65M cement plant, aimed at meeting growing demand in the country. The plant, which is scheduled to commence operations before the end of 2018, will have a capacity of 0.7 mtpa. The plant is to be constructed in the Musanze District, in the country's Northern Province.
- Tanzania
    - Manyara Cement is seeking investors to enable the development of a 0.58Mt/yr plant in the Hanang District of the Manyara Region. The first phase of the project is estimated to cost USD 38M.
    - Sinoma envisions developing a USD 1B cement plant in Tanga, aimed at exporting. Approximately 70% of cement produced at the plant will be exported to local countries including Somalia, Kenya, Mozambique, Sudan, the Democratic Republic of Congo and Uganda.

Lake Victoria Transport Potential

- Cement consumption volumes in the EAC are growing rapidly, boosting potential for trade.
- There are several large-scale projects scheduled for implementation in Uganda and other EAC countries. The capacity expansions brought forth by these projects could result in dwindling imports from Global markets, as the EAC countries' become self-sufficient in terms of cement production.
- The majority of planned cement plant developments comprise integrated facilities, covering the process from limestone mining to cement production. This limits the potential for importing input materials; however, there is still a substantial potential for imports of coal, as 200 – 450 kg of coal is required to produce a ton of cement.
- The majority of planned developments are in the Eastern regions of Uganda, near the largest remaining limestone deposits. Inputs sourced from global markets, which are likely to be imported through the port of Mombasa, cannot be efficiently transported to Tororo and Mbale by lake transport. However, inputs sourced from Tanzania or imported through Dar es Salaam port present a substantial opportunity for Lake Victoria transport.
- Rwanda and Burundi have limited production capacities. If production in Uganda exceeds demand, trade potential between Uganda and Rwanda and Burundi may be boosted. Transport of cement from production locations in the Eastern regions of Uganda to Rwanda and Burundi can be efficiently accommodated by the Lake Victoria transport system.

2.2.3 Oil & Gas

Current Situation

Oil and gas exploration activities in Uganda were first documented in 1925. However, major oil and gas discoveries were only made recently; during the last decade, reserves amounting to 6.5 B barrels of oil and 499 B cubic metres of gas were discovered. Of the discovered oil reserves, approximately 1.4 B barrels is estimated to be recoverable. The majority of these reserves have been found around Lake Albert, in Uganda's western Albertine Graben region.

Additionally, oil reserves of approximately 1.0 B barrels have been discovered in Kenya and gas reserves of between 2.7 and 3.8 trillion cubic feet have been discovered in Tanzania.

However, oil-related infrastructure required to leverage the oil reserves is currently lacking in Uganda; as such, all required petroleum products are currently imported, as can be observed from the substantial mineral fuels and oils import volumes presented in Table 2-1.

Figure 2.5 Oil and Gas in the Albertine Graben Region

Developments

- In August of 2016, Uganda granted 8 oil production licenses to Tullow Uganda Operations, Total E&P Uganda, and China National Offshore Oil Corporation (CNOOC) in the Albertine Graben region.
- Following the approval of oil production licenses, several infrastructure development projects, have been launched. These developments, with a combined investment value of approximately USD 10 B, include the following:
  - A Greenfield refinery with a capacity of 60,000 barrels per day, which is to be developed in 2 phases of each 30,000 barrels per day. The refinery is to be located near Hoima and is scheduled for completion in 2020. However, the project faces potential delays, as the potential investor, as subsidiary of Russian state corporation Rostec, pulled out of the project.
  - A 1,445 km heated export pipeline from Hoima to Tanga or Dar es Salaam, which can be used to transport both crude oil and petroleum projects. Previously, a connection between Hoima and Lamu (Kenya) was under consideration; however, the route was revised due to issues with potential security issues along the Hoima – Lamu route.
  - A storage and distribution terminal at Buloba near Kampala. The envisioned land plot for this project has already been acquired.
  - A Transport corridor between the Buloba storage terminal and the Hoima refinery. A Resettlement Action Plan (RAP) study for this project is ongoing.

Figure 2.6 EAC Oil Pipeline Routes

Lake Victoria Transport Potential

- The majority of oil sector developments in Uganda are in the Northwestern regions of the country, near Lake Albert. For the purpose of exporting the crude oil and petroleum products that exceed national demand, a 1,445 km pipeline is to be developed between Hoima in Uganda and Tanga or Dar es Salaam in Tanzania. However, it is unlikely that such a large-scale project will be completed in the short to medium term. In the meantime, the Lake Victoria transport system can be used to transport the oil products either to Mombasa (through Kisumu) or to Dar es Salaam (through Mwanza).
- Imports of oil products will likely decrease, as local refining capacity is developed.

2.2.4 Iron & Steel

Current Situation

Uganda currently has 12 active steel processing companies, as presented in Table 2-6. These companies have a combined production capacity of over 500,000 tons per annum; however, despite the fact that the local steel producers operated at 30% - 50% of their capacity in 2016, an estimated 25% of steel consumption in 2016 comprised imported steel.

The imported steel volumes were mainly used in ongoing large-scale infrastructure projects, including two hydroelectricity power dams, at Karuma (600 MW) and Isimba (183 MW), and the Kampala-Entebbe Express Highway. These projects are being undertaken by Chinese firms, which sourced steel products from China instead of buying locally. This is mainly caused by lagging standards and technology at the majority of Ugandan steel producers, making their products unsuited for these large-scale projects.

Table 2-6 Uganda Steel Producers

Company	Owner Group	Location	Steel Production Capacity (Tons per Annum)	
			Crude Steel	Rolled Steel
Steel Rolling Mills	Alam Group	Jinja	70,000	50,000
Steel Corp of East Africa	Madhvani Group	Jinja	24,000	34,000
Tembo Steel		Iganga	12,500	10,000
Tembo Steel		Lugazi	9,000	9,000
Roofings Ltd		Lubowa	N/A	N/A
Steel & Tube Industries		Kampala	N/A	N/A
China Machine Building International Co		Mbarara	N/A	N/A
MM Integated Steel Mills		Jinja	N/A	N/A
Uganda Baati Ltd		Kampala; Tororo; Arua	N/A	N/A
Roofing Rolling Mills		Namanve Industrial Park	N/A	N/A
Pramukh Steel Ltd		Njeru	N/A	N/A
Mayuge Sugar Industries (Steel Division)		Jinja	N/A	N/A

Source: USGS Uganda Minerals Yearbook 2014

Subsequently, the table below provides an overview of steel production and consumption figures for Uganda. It can be observed that both production and consumption have grown quite steadily between 2009 and 2015, with a small consumption dip in 2015.

Table 2-7 Uganda Steel Consumption and Production

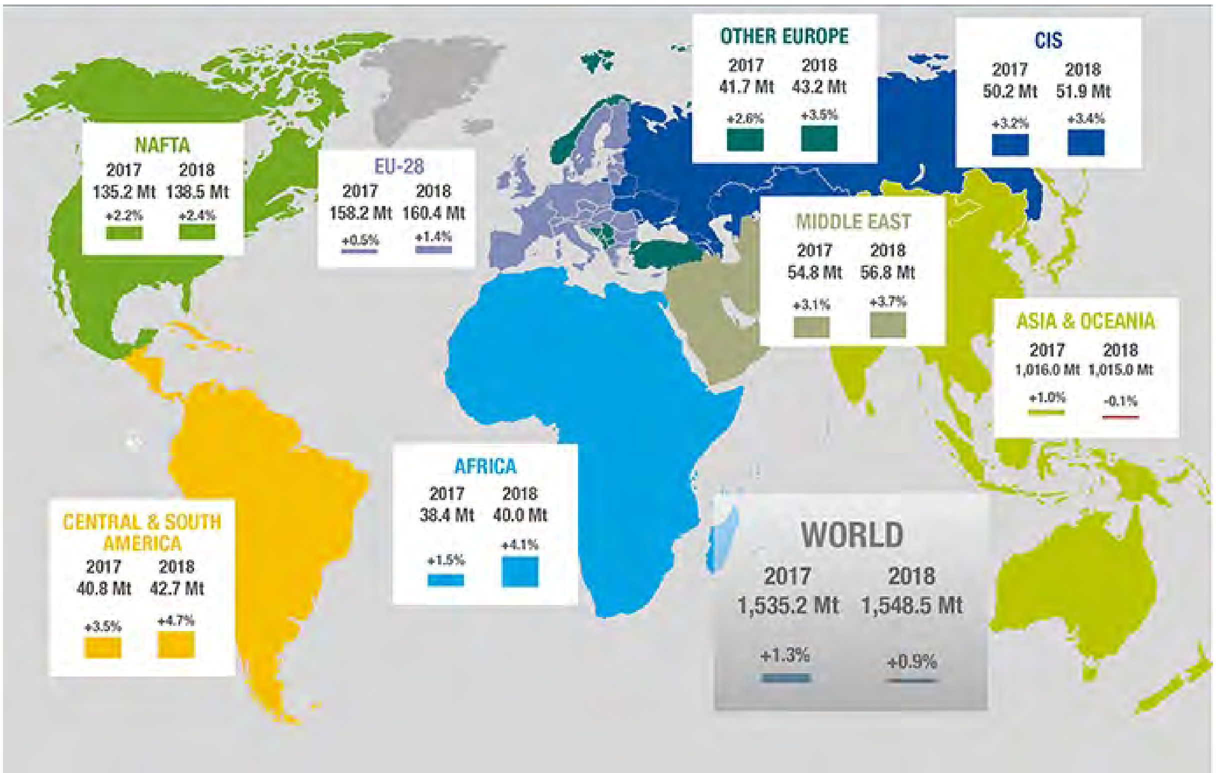
Item	Unit	2007	2008	2009	2010	2011	2012	2013	2014	2015
Crude Steel Production	1,000 Tons	7	7	54	59	65	60	64	67	N/A
Steel Consumption (Crude Steel Equivalent)	1,000 Tons	101	119	121	200	161	78	131	160	155
Steel Consumption per Capita (Crude Steel)	Kg	3.4	3.8	3.8	6.0	4.7	2.2	3.6	4.2	4.0
Steel Consumption (Finished Steel)	1,000 Tons	95	112	114	188	152	73	123	151	145
Steel Consumption per Capita (Finished Steel)	Kg	3.2	3.6	3.6	5.7	4.4	2.1	3.4	4.0	3.7

Source: World Steel Association; USGS Uganda Minerals Yearbooks 2011 - 2014

Developments

- According to the World Steel Association (2017), steel demand in Africa will increase by 1.5% in 2017 and 4.1% in 2018.
- In 2013, Guangzhou Dongsong Energy Group, a Chinese firm, was awarded a 49-year lease to mine phosphates in the Tororo region, as part of the larger Sukulu phosphate and steel project. Besides the mining operations, the firm intends to develop a 12 MW power plant and facilities to produce 300,000 tons of steel and 300,000 tons of fertiliser per annum.
- To increase consumption of locally produced steel, the GoU announced that it would be implementing the “Buy Uganda, Build Uganda” policy. As part of this policy, Uganda’s four major steel producers, which adhere to the required quality and technology standards, are being prepared to put in place equipment required to supply an estimated 85,000 tons of steel for the Ugandan section of the SGR. The four major steel producers comprise Roofings Ltd, Madhvani Group, Steel & Tube Industries, and Steel Rolling Mills.

Figure 2.7 Short Term Global Steel Demand Outlook



Source: World Steel Association, 2017

Lake Victoria Transport Potential

- The Buy Uganda, Build Uganda policy may result in decreased imports of steel products, thus reducing potential for Lake Victoria trade.
- Similar to the cement production, steel production uses coal as an important input for the heating process; approximately 60% of steel produced uses (coking) coal. In order to produce 1 ton of steel, approximately 600 kg of coke, which requires 770 kg of coal, is used. As many of Uganda’s steel production facilities are situated near Kampala and Jinja, the lake transport systems is very well suited to transport the required coal from the global markets to Uganda’s steel production facilities.

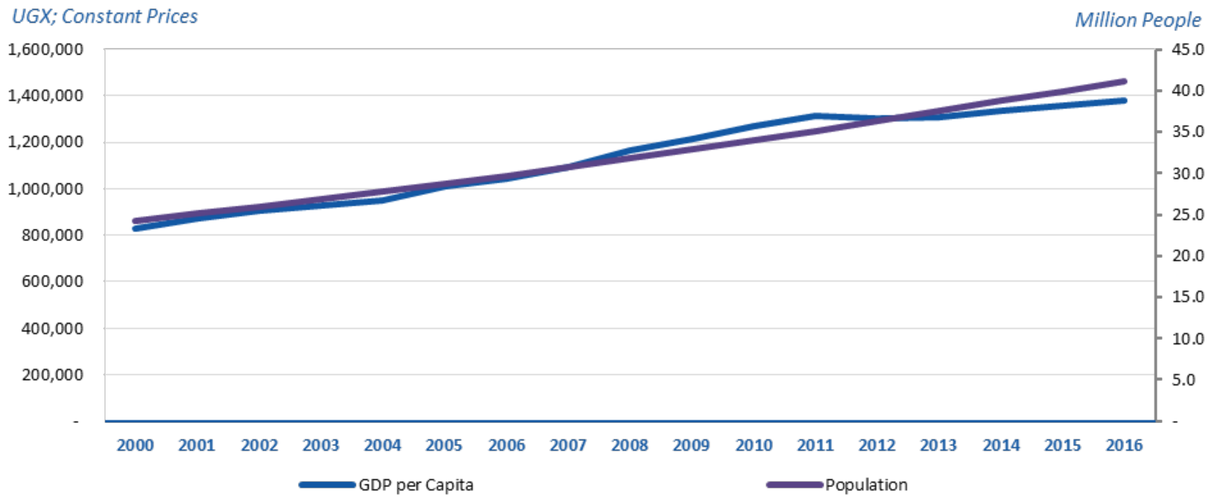
2.2.5 Containerised Cargo

Current Situation

As discussed in section 1, the containerised cargo trade to and from Uganda mainly comprises transit cargo that is transported through either Mombasa or Dar es Salaam. This cargo stream is growing rapidly – between 2005 and 2014, full transit container volumes between the port of Mombasa and Uganda increased at a Compound Annual Growth Rate (CAGR) of 10.28%.

This growth is underpinned by continuous population and economic growth in Uganda. The figure below presents the GDP per capita and population development in Uganda over the period from 2000 to 2016. Over this period, GDP per capita increased at a CAGR of 3.24%; the population grew at a CAGR of 3.34%.

Figure 2.8 Uganda - GDP per Capita and Population Growth



Developments

- As discussed in section 1, an SGR connection between Mombasa and Kampala is currently being developed. Once this development is completed, it will offer an efficient and high capacity direct rail route for the transit cargo, as an alternative to the lake transport route and the all road route.

Lake Victoria Transport Potential

- As Kampala and Jinja are the main production and consumption centres for the containerised cargoes, these transit container flows can be efficiently transported over the lake. This can be observed from Figure 2.9.
- The lake transport system is currently not well equipped to deal with the containerised cargo flows, as the rail-wagon ferry system is not operational, no adequate RoRo services are provided, and the lake ports lack LoLo equipment. As such, the envisioned overhaul of the lake transport system is required to efficiently transport containerised cargoes.
- Due to the SGR development, it is expected that potential market shares for the lake transport route will deteriorate in the long term.

Figure 2.9 Transit Cargo Flows to/from Uganda – Short to Medium Term

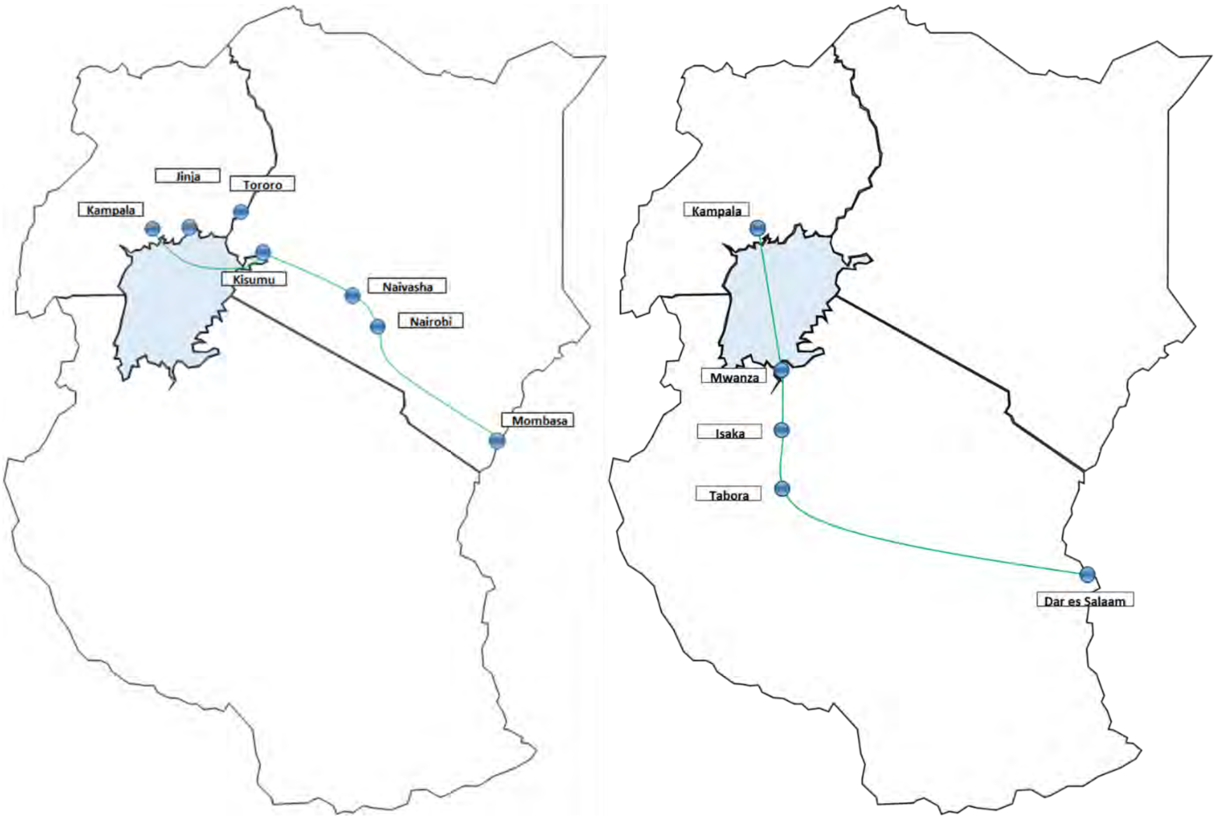
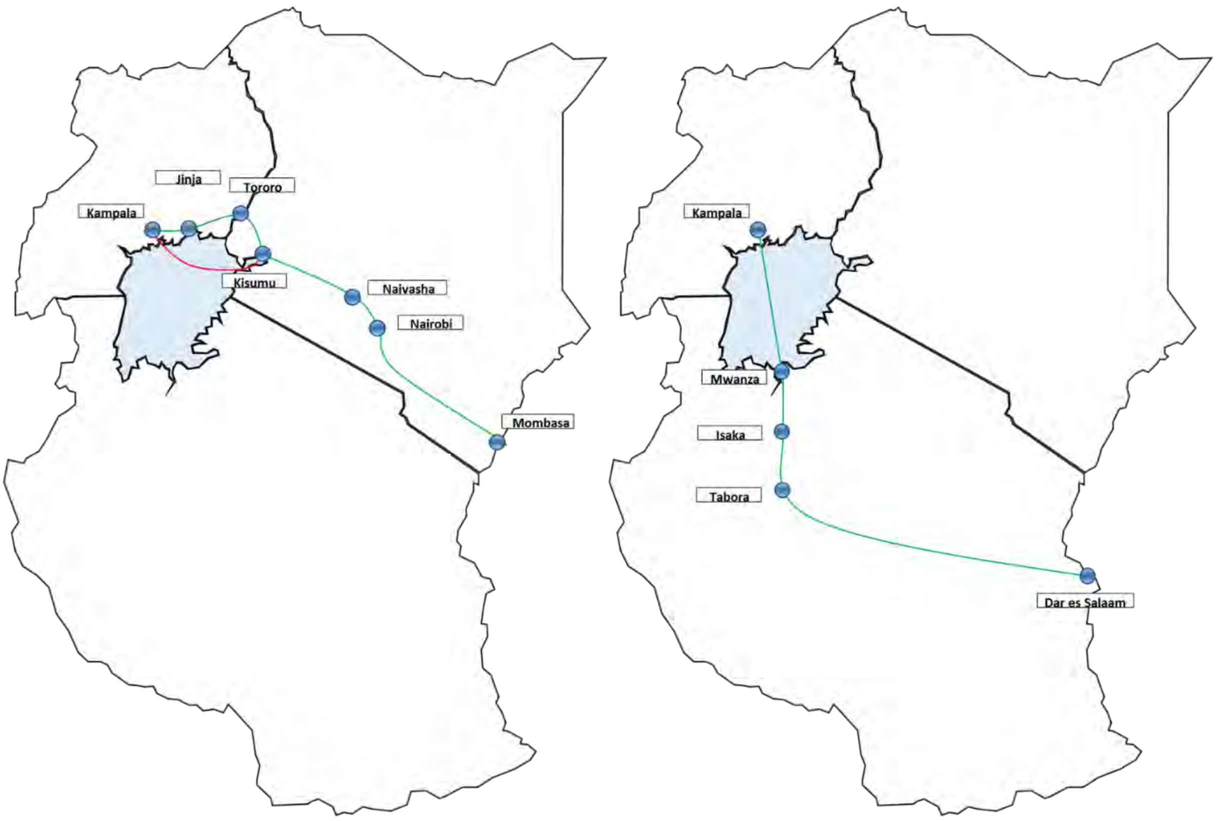


Figure 2.10 Transit Cargo Flows to/from Uganda – Long Term



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3 Demand Forecast

Summary

Section 3 focuses on forecasting both cargo ("Influence Area A" and "Influence Area C") and passenger traffic ("Influence Area B") on Lake Victoria. Cargo demand for the point to point cargo vessel operations will be assessed and projected in section 3.1; subsequently, passenger volumes for the ferry services are assessed and projected in section 3.2.

Cargo Demand Forecast

The freight demand forecast methodology is based on the forecasting model developed in 2014 for the study "Regional Transport Intermodal Strategy and Action Plan in the EAC Countries". The forecast model consists of a multimodal transport network (road, railways, lake transport, and seaports) for the wider East African Community (EAC) region. The network in this region consists of links and nodes, as can be observed in the figure below. A detailed overview of the methodology is provided in Appendix IV.

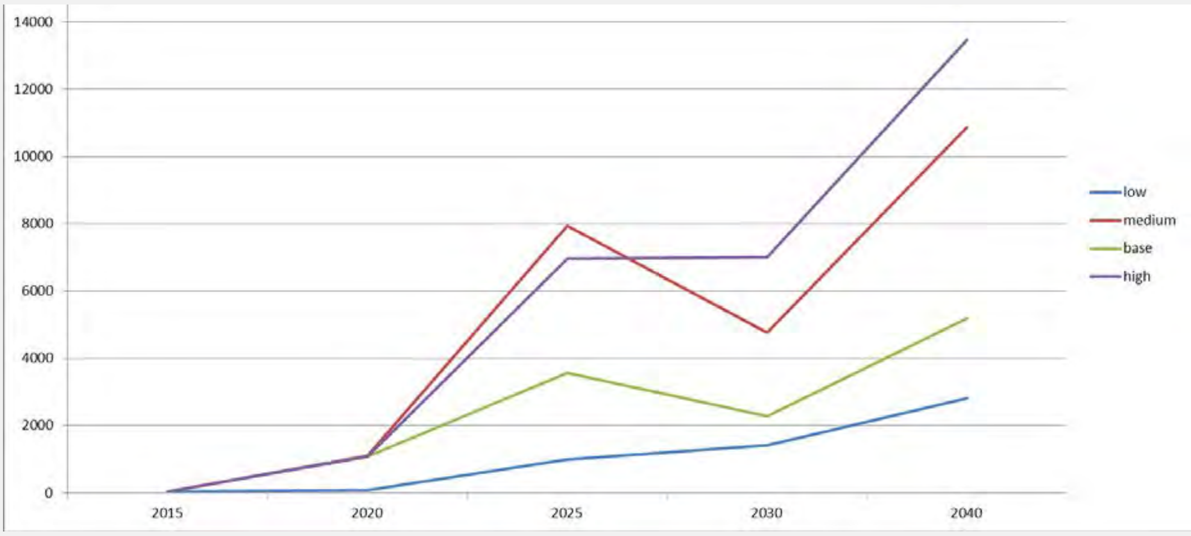
In order to reflect the assess the impact of several uncertain infrastructure developments in the region, several scenarios have been developed. These scenarios enable assessment of the Lake Victoria cargo streams given various assumptions regarding the future state of the regional transport network.

Inter alia, the scenarios entail assumptions regarding (i) the level of development of the Lake Victoria transport system and its current ports; (ii) the development of Greenfield ports on Lake Victoria, such as Bukasa port; and (iii) the development of a Standard Gauge Railway (SGR) connection around the lake.

In all scenarios, the growth in throughput is significant due to both the economic growth and the infrastructure investments. Comparatively, the current annual throughput in Port Bell is approximately 30 ktons (2015), down from around 500 ktons in the late 1990s when the lake transport system was more active. The following observations can be made:

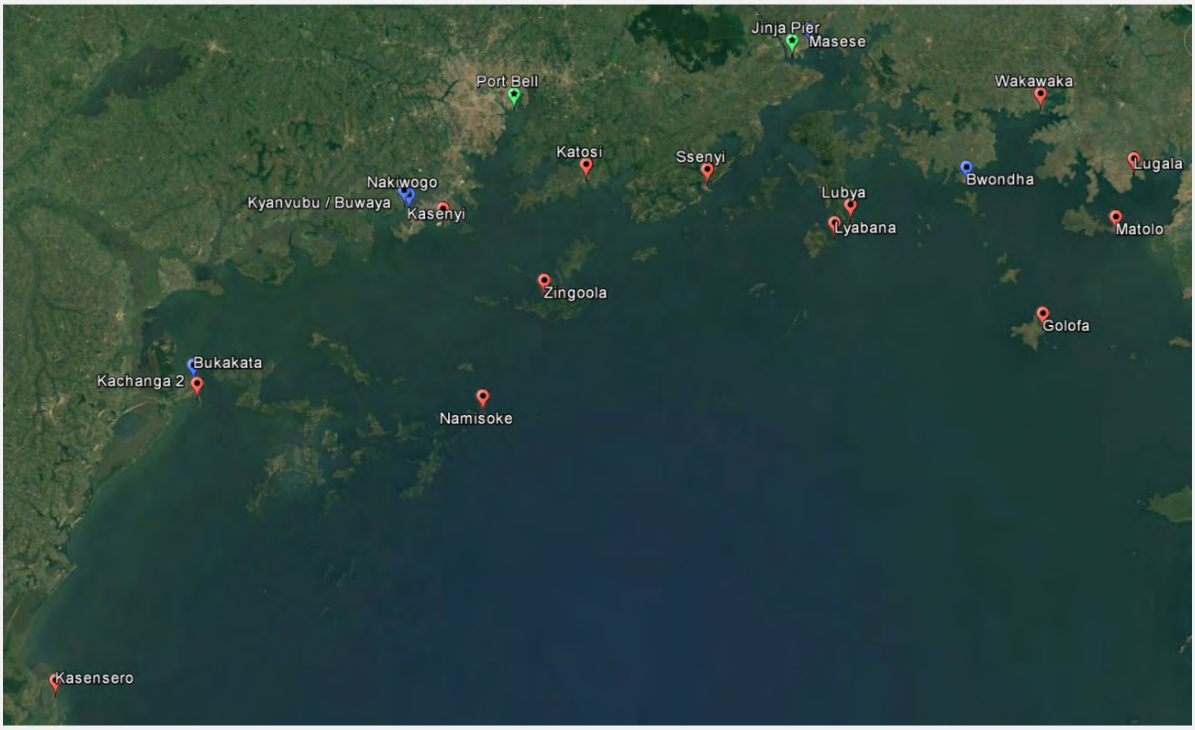
- Only a limited amount of freight is handled in Jinja; at most, a third of the Ugandan tonnage is handled at Jinja.
- In line with expectations, the low scenario has the lowest throughput of all the scenarios for the Ugandan ports. Substantial growth can still be observed in Kampala, as this remains the economic centre of the country and, thus, a substantial cargo generator. However, the development of the SGR has a negative impact on lake trade volumes. Moreover, a substantial share of the Kampala volumes may be transported through Bukasa in the low case scenario, as it is assumed that Port Bell is not improved significantly.
- The medium scenario generates the second largest tonnage for the Ugandan ports. Under this scenario, the Uganda ports are positively impacted by the harmonized development of the lake transport system and the rehabilitation and development of hinterland connections.
- The base scenario generates about half the traffic of the medium scenario for the Ugandan ports. In this scenario, the rail connections to the ports of Port Bell, Jinja, Mwanza, and Kisumu are not redeveloped, resulting in reduced lake transport competitiveness. However, as Bukasa port is not developed, the full Kampala volumes will be transported through Port Bell, resulting in higher Port Bell volumes, as compared to the medium case scenario.
- The high case scenario shows strong growth for the Ugandan port sector. The Standard Gauge Railway is not developed and rail and road access to all the ports of the lake are upgraded/developed. This stimulates the development of both Kampala and Jinja. Additionally, the port of Bukasa is not developed in the high case scenario, resulting in the full Kampala volumes being transported through Port Bell.

The figure on the next page presents the forecast development of cargo flows for Ugandan ports for each of the 4 identified scenarios. Figures are presented in kilotons.



<u>Passenger Demand Forecast</u>

In order to map the current passenger transport activities on Lake Victoria, a passenger survey was carried out from the 16th to the 23rd of March 2017. This survey included 24-hour surveys at several locations. The surveys consisted of manual counts and interviews of users of the landing sites. In total, 20 landing sites ports were selected for the surveys, out of an initial pre-selection of over 250 landing sites. The following map provides the locations of the selected landing sites. Subsequently, a passenger traffic model was developed in VISUM to model the current situation in line with the average daily survey volumes.



Following the base year modelling, 3 ferry service configurations were developed, due to the significant amount of potential landing sites and ferry routes. The scenarios were developed based on the surveys, the resulting base year model flows, and a review of several preceding strategic Lake Victoria studies. The configurations are summarised in the table on the next page.

Configuration	Characteristics of Configuration
Configuration 1	• Similar to the network configuration presented in the 2015 Investment Plan for Lake Connectivity
Configuration 2	• Based on survey results and demographic data • Aimed at providing an equal spread between the eastern, central, and western regions of Lake Victoria to optimize connectivity
Configuration 3	• Similar to configuration 2, but with additional routing optimisations (e.g., routes with more than 2 ferry stops, in order to minise CAPEX) • Additional "Airport Express", which connects Kampala city (Port Bell) to Kampala airport (Kigungu landing site)

Subsequently, the figure below presents the forecast 2040 daily two-way passenger volumes for the preferred scenario, scenario 3; the table below provides a more detailed overview of the forecast daily passenger volumes for each of the selected ferry routes in scenario 3.

Route	Unit	2020	2025	2030	2035	2040
Bugaia - Lyabaana	Passengers per Day	214	249	289	332	379
Bukakata – Luku*	Passengers per Day	2,538	2,963	3,434	3,948	4,498
Buvuma – Kiyindi**	Passengers per Day	1,518	1,772	2,054	2,361	2,689
Buwanzi – Namoni – Masese	Passengers per Day	2,485	2,901	3,363	3,865	4,403
Buziri - Ssenyi	Passengers per Day	618	721	835	960	1,094
Bwondha – Matolo – Golofa	Passengers per Day	516	603	698	802	914
Damba Island – Katosi – Port Bell	Passengers per Day	752	878	1,017	1,170	1,332
Nakiwogo – Lutoboka***	Passengers per Day	200	233	271	311	354
Kyanvubu – Nakiwogo**	Passengers per Day	2,522	2,945	3,413	3,923	4,469
Ssenyi – Lwaji Island	Passengers per Day	129	151	175	201	229
Nakiwogo - Zingoola	Passengers per Day	152	178	206	237	270
Port Bell - Namisoke	Passengers per Day	130	152	176	203	231
Port Bell – Ggaba - Kigungu	Passengers per Day	1,141	1,332	1,544	1,775	2,021
Total	**Passengers per Day**	**9,893**	**11,548**	**13,384**	**15,385**	**17,527**

This section will focus on forecasting both cargo ("Influence Area A" and "Influence Area C") and passenger traffic ("Influence Area B") on Lake Victoria. Cargo demand for the point to point cargo vessel operations will be assessed and projected in section 3.1; subsequently, passenger volumes for the ferry services are assessed and projected in section 3.2.

3.1 Cargo Demand

The cargo demand section is structured as follows:

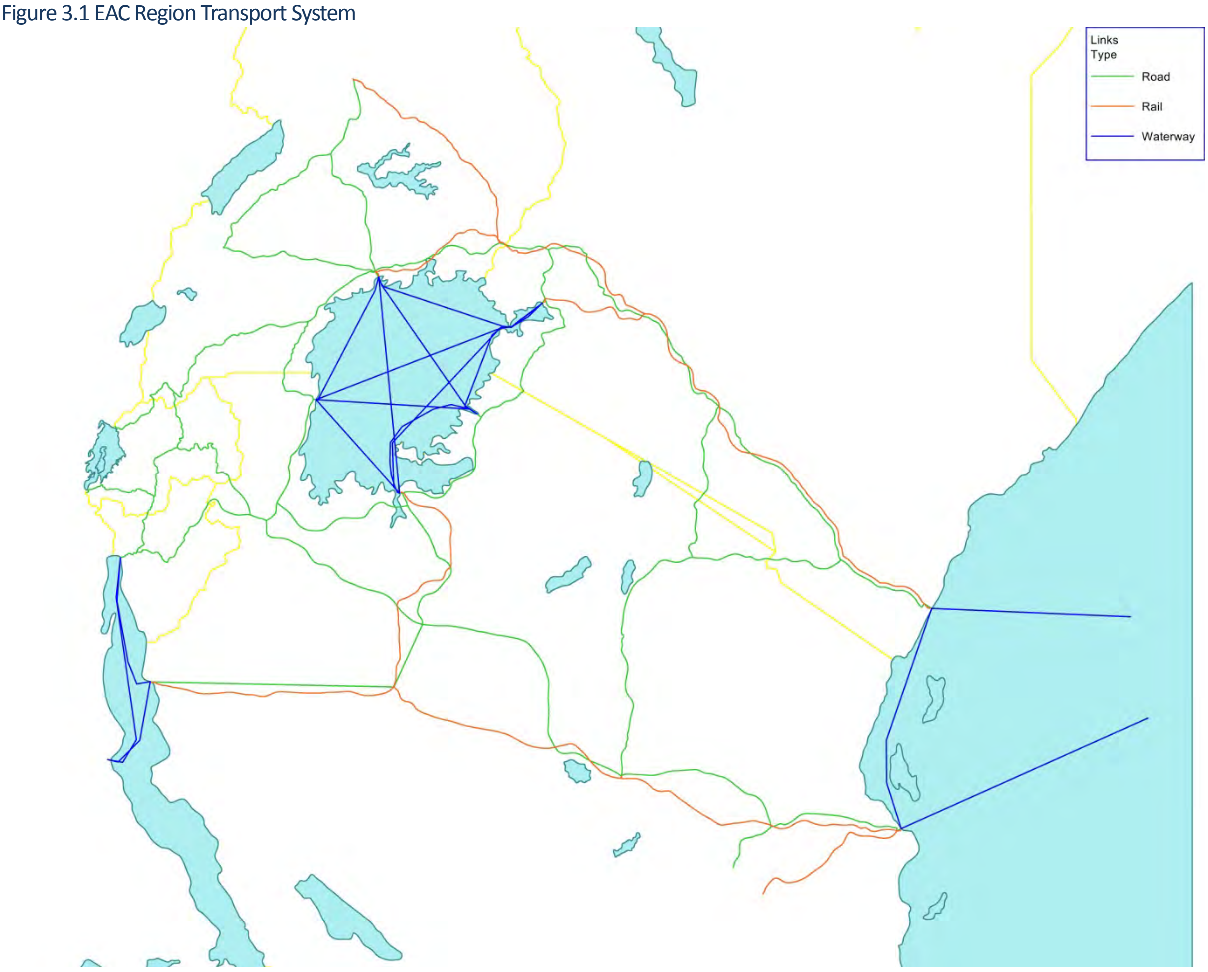
- Section 3.1.1 elaborates on the methodology that was applied to forecast the cargo volumes.
- The main assumptions of the forecast are presented in section 3.1.2.
- The results of the forecast are presented in section 3.1.3.

3.1.1 Methodology

The freight demand forecast methodology is based on the forecasting model developed in 2014 for the study "Regional Transport Intermodal Strategy and Action Plan in the EAC Countries" (a detailed methodology of the forecasting model is presented in Appendix IV). This forecast model has been updated and refined for this study, in order to incorporate the latest available data and enable a more fine-grained view of the Ugandan port sector.

The forecast model consists of a multimodal transport network (road, railways, lake transport, and seaports) for the wider East African Community (EAC) region. The network in this region consists of links and nodes, as can be observed in the figure below. Each link corresponds to one transport mode and has coded impedance per kilometre (generalised time). Each node represents either a border point or a transfer point. At nodes, penalties are applied to model the time lost and the costs of loading and unloading in the case of a transhipment.

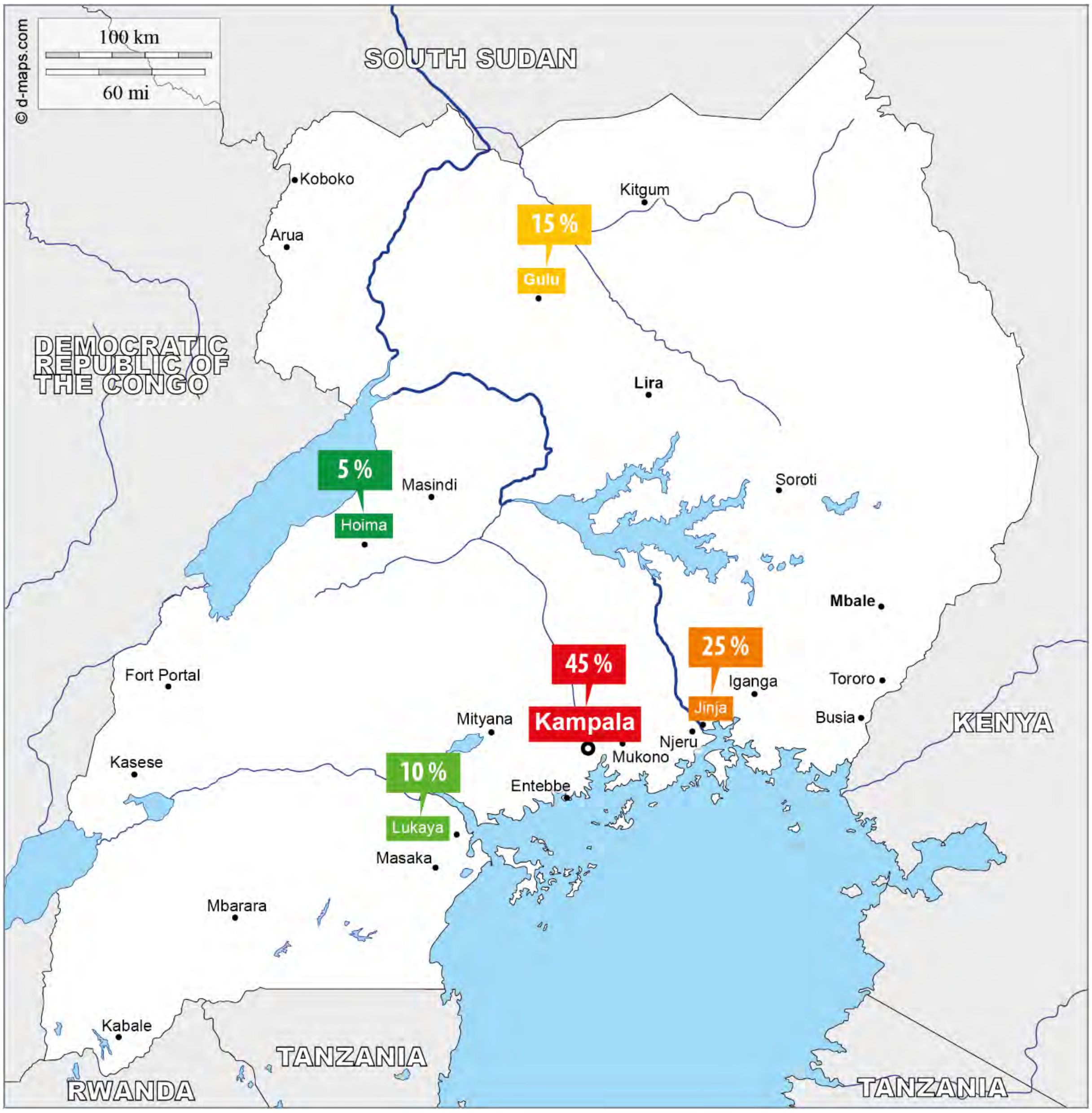
Figure 3.1 EAC Region Transport System



The wider EAC area is divided into 24 zones, of which 18 are internal (Uganda, Tanzania, Kenya, Rwanda, Burundi) and 6 are external (outside the EAC region). Each of these zones is considered as an origin and a destination for the moving goods. Transportation of goods between the zones and within the zones are coded in an O-D matrix in kilotons.

Uganda was split from 3 to 5 zones to provide a higher level of detail and enable distinction between Jinja pier and Port Bell in Kampala. The travel demand for Uganda was therefore split according to the shares in the map below, based on (i) economic attractiveness, (ii) population, and (iii) the current level of activities in ports. Kampala, being the economic centre of the country, generates and attracts the largest demand for goods transportation.

Figure 3.2 Cargo Forecast - Cargo Allocation in Uganda



These cargo allocation shares are subsequently incorporated in the network model. For goods moving towards/from the Ugandan zones, preferred routes are determined, based on the generalised time of the possible routes in the model. The generalised is based on (i) waiting and travel time, (ii) the costs of transport, (iii) transfer requirements, and (iv) the reliability of the transport modes. More details on the parameters used in the models can be found in Appendix IV.

3.1.2 Forecast Assumptions

Economic Growth

Regarding economic growth of the modelled region, the medium economic growth forecast was applied (see Appendix IV for a more detailed overview of the GDP growth forecast). This scenario assumes a continuation of the current GDP growth trend of 8% per year for Uganda until 2040. This growth assumption is based on observed and estimated values from 2001 to 2019 (IMF World Economic Outlook). These data have not changed significantly since the 2014 study; hence, the values were and were not updated in the model. The development of the Albertine and Musongati mines were also separately included in the forecast.

Projected transport infrastructure

Due to uncertainties regarding several important transport infrastructure developments, four scenarios were developed to model the future infrastructure situation (see the table below for a summarised overview of the scenarios). These scenarios enable assessment of the Lake Victoria cargo streams given various assumptions regarding the future state of the regional transport network. Long distance roads improvements projects are not included in the scenarios due to a lack of information and clarity on such schemes.

Table 3-1 Cargo Forecast - Infrastructure Development Scenarios

Development	Description	Scenario				Timing
		Low	Medium	Base	High	
1	Development of the Standard Gauge Railway (SGR) between Mombasa and Kampala	x	x	x		2030
2	Harmonized development of a working freight transport system on Lake Victoria		x	x	x	2020
3	Development of Lukaya Port and Bukasa Port	x	x			2025
4	Development of road connections for Port Bell, Jinja, Kisumu and Mwanza Port		x	x	x	2020
5	Development of rail connections for Port Bell, Jinja, Kisumu and Mwanza Port		x		x	2025
6	Combination of connections for Bukasa and Port Bell*		x			2025
7	Rehabilitation of the northern railway line	x	x			2030
8	Rehabilitation of the Central Rail Corridor		x		x	2030
9	New rail connection between Kampala, Kasese, Kigali, and Bujumbura	x				2040
10	New rail connection between Isaka and Kigali, with a branch to Musongati	x				2040
11	Rehabilitation of the Dar es Salaam – Isaka railway line		x		x	2025

**Development 6 is necessary to enable the combined effect of Bukasa Port and Port Bell. Without this development, only one of them is modelled.*

Subsequently, the table below provides an overview of the time and cost assumptions applied for each of the infrastructure developments. These assumptions have been used in the model to determine preferred routes between origin destination pairs.

Table 3-2 Cargo Forecast - Infrastructure Development Assumptions

Dev	Development Component	Waiting Time (Hours)	Travel Speed (kmph)	Operational Time (%)*	Transport Cost (USD / ton / km)
1	New rail connection between Nairobi and Kampala (651 km)	n/a	40.0	70%	0.061
	Rail from Mombasa to Nairobi	n/a	36.4	70%	0.061
	Transfer from rail to road (Nairobi)	36	n/a	n/a	n/a
2	Development of all ports and lake safety measures	n/a	30.0	100%	0.050
3	Development of Lukaya and Bukasa ports	n/a	n/a	n/a	0.050

Dev	Development Component	Waiting Time (Hours)	Travel Speed (kmph)	Operational Time (%)*	Transport Cost (USD / ton / km)
4	Improvement of Kampala, Jinja, Kisumu, and Mwanza road connections	50.0	n/a	n/a	n/a
5	Improvement of Kampala, Jinja, Kisumu, and Mwanza rail connections	50.0	n/a	n/a	n/a
6	Connection of Bukasa port and Port Bell	40.0	n/a	n/a	0.042
7	Rehabilitation of Nairobi – Kampala narrow gauge rail	n/a	36.4	70%	0.061
8	Rehabilitation of all Central Corridor rail connections, except Dar es Salaam to Isaka	n/a	36.0	60%	0.053
9	New rail between Kampala and Bujumbura (990 km)	n/a	40.0	70%	0.061
	New transfers between rail and road	36.0	n/a	n/a	n/a
	New transfers between rail and lake transport	132.0	n/a	n/a	6
10	New rail connection between Isaka and Kigali (539 km)	n/a	40.0	70%	0.061
	New transfers between rail and road	36.0	n/a	n/a	n/a
11	Rehabilitation of rail between Dar es Salaam and Isaka	n/a	36.0	60%	0.053

*The operational time is equal to 100% minus the time that a truck/train/vessel spends inactive

3.1.3 Forecast Results

The tables below present the projected volumes from the transport model for the years 2020, 2025, 2030, and 2040. The projected volumes are projected are provided in kilotons, for each of the identified scenarios. Furthermore, the projected values comprise the amount of cargo handled per port; hence, each cargo flow is counted twice (once at the loading port and once at the discharging port).

Table 3-3 Cargo Forecast - 2020 Projection

Port	Low Case ('000 Tons)	Medium Case ('000 Tons)	Base Case ('000 Tons)	High Case ('000 Tons)
Lukaya	0	0	0	0
Kampala (Port Bell + Bukasa)	69	819	793	793
Jinja	24	295	281	281
Uganda Total	**93**	**1114**	**1074**	**1074**
Kisumu	2	634	629	629
Musoma	8	19	7	7
Mwanza	93	910	846	846
Bukoba	10	155	150	150
Total	**103**	**1416**	**1353**	**1353**

Table 3-4 Cargo Forecast - 2025 Projection

Port	Low Case ('000 Tons)	Medium Case ('000 Tons)	Base Case ('000 Tons)	High Case ('000 Tons)
Lukaya	300	2006	0	0
Kampala (Port Bell + Bukasa)	656	3739	2872	4366
Jinja	29	2203	694	2593
Uganda Total	**985**	**7948**	**3566**	**6950**
Kisumu	280	5886	2473	5668
Musoma	96	66	18	58
Mwanza	618	3067	2002	2655
Bukoba	37	317	315	370
Total	**1008**	**8642**	**4187**	**7855**

Table 3-5 Cargo Forecast - 2030 Projection

Port	Low Case ('000 Tons)	Medium Case ('000 Tons)	Base Case ('000 Tons)	High Case ('000 Tons)
Lukaya	476	1134	0	0
Kampala (Port Bell + Bukasa)	878	2258	1451	4329
Jinja	60	1377	826	2675
Uganda Total	**1414**	**4769**	**2277**	**7004**
Kisumu	7	1206	927	5600
Musoma	121	114	27	79
Mwanza	839	3983	2014	2872
Bukoba	45	374	323	415
Total	**1213**	**5223**	**2784**	**7985**

Table 3-6 Cargo Forecast - 2040 Projection

Port	Low Case ('000 Tons)	Medium Case ('000 Tons)	Base Case ('000 Tons)	High Case ('000 Tons)
Lukaya	931	2525	0	0
Kampala (Port Bell + Bukasa)	1777	5205	3310	8394
Jinja	113	3138	1879	5079
Uganda Total	**2821**	**10868**	**5189**	**13473**
Kisumu	174	3279	1756	9830
Musoma	323	245	64	180
Mwanza	1634	8411	4318	6678
Bukoba	74	779	681	887
Total	**2513**	**11791**	**6004**	**15524**

In all scenarios, the growth in throughput is significant due to both the economic growth and the infrastructure investments. Comparatively, the current annual throughput in Port Bell is approximately 30 ktons (2015), down from around 500 ktons in the late 1990s when the lake transport system was more active. The following observations can be made:

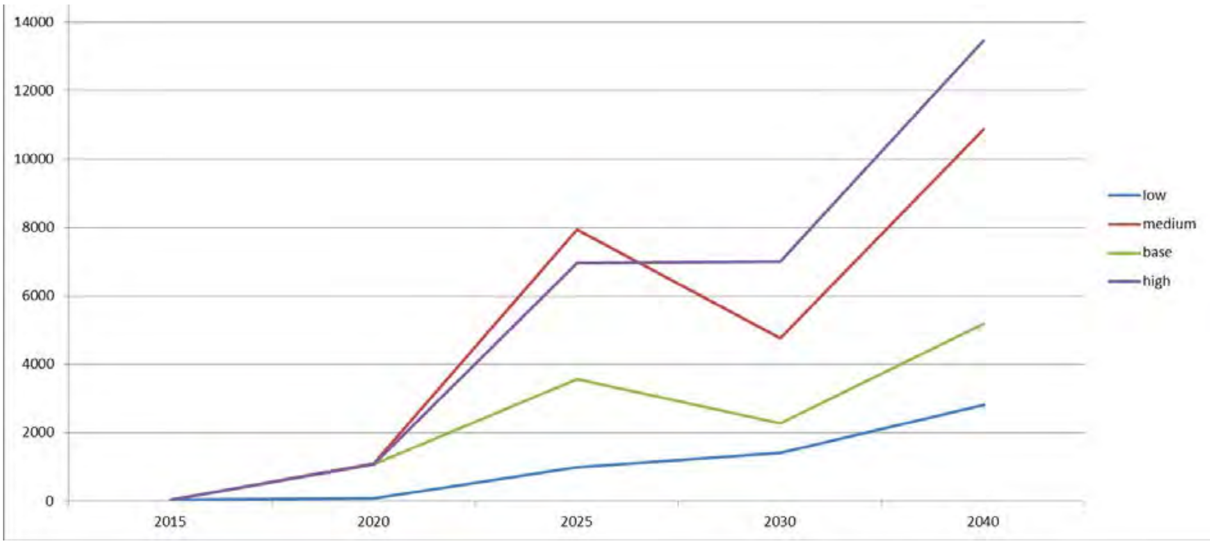
- Only a limited amount of freight is handled in Jinja; at most, a third of the Ugandan tonnage is handled at Jinja.
- In line with expectations, the low scenario has the lowest throughput of all the scenarios for the Ugandan ports. Substantial growth can still be observed in Kampala, as this remains the economic centre of the country and, thus, a substantial cargo generator. However, the development of the SGR has a negative impact on lake trade volumes. Moreover, a substantial share of the Kampala volumes may be transported through Bukasa in the low case scenario, as it is assumed that Port Bell is not improved significantly.
- The medium scenario generates the second largest tonnage for the Ugandan ports. Under this scenario, the Uganda ports are positively impacted by the harmonized development of the lake transport system and the rehabilitation and development of hinterland connections.
- The base scenario generates about half the traffic of the medium scenario for the Ugandan ports. In this scenario, the rail connections to the ports of Port Bell, Jinja, Mwanza, and Kisumu are not redeveloped, resulting in reduced lake transport competitiveness. However, as Bukasa port is not developed, the full Kampala volumes will be transported through Port Bell, resulting in higher Port Bell volumes, as compared to the medium case scenario.
- The high case scenario shows strong growth for the Ugandan port sector. The Standard Gauge Railway is not developed and rail and road access to all the ports of the lake are upgraded/developed. This stimulates the development of both Kampala and Jinja. Additionally, the port of Bukasa is not developed in the high case scenario, resulting in the full Kampala volumes being transported through Port Bell.

Table 3-7 provides a summarised overview of the cargo volumes at Ugandan ports over the forecast period. Subsequently, Figure 3.3 visualises the development of the cargo volumes handled in all Ugandan ports over the forecasting period, for each of the identified scenarios. As mentioned above, the drop/stagnation in traffic in some scenarios between 2025 and 2030 is due to the extension of the Standard Gauge Railway to Kampala, which has a significant impact on the lake traffic between Uganda and Kisumu.

Table 3-7 Cargo Forecast - Projection Overview

Scenario	CAGR (2015 – 2040)	2015 ('000 Tons)	2020 ('000 Tons)	2025 ('000 Tons)	2030 ('000 Tons)	2040 ('000 Tons)
Uganda Low	20%	30	93	985	1,414	2,821
Uganda Medium	27%	30	1,114	7,948	4,769	10,868
Uganda Base	23%	30	1,074	3,566	2,277	5,189
Uganda High	28%	30	1,074	6,950	7,004	13,473

Figure 3.3 Cargo Forecast - Projection Overview



The figures on the following pages visualise the annual volumes per route and per direction for the base case scenario for each of the assessed years in the forecast period. This enables the identification of the routes with the highest projected volumes under the base case scenario assumptions.

These figures also highlight the importance of the link from Kampala and Jinja in Uganda to Mwanza in Tanzania. The connection between these two regions appears the most efficient via waterborne transport, with no alternative other than a long (and unsafe) route via the road. These water routes are already the most used today and have already been identified by stakeholders as the most adequate for the development of RoRo shipping services.

Furthermore, the link between Kampala and Kisumu experiences a substantial growth in volumes initially, as the road connections to the ports are improved and the lake transport system is revived. By 2030, volumes along this trade route diminish again, as the SGR connection between Mombasa and Kampala is completed.

The link between Jinja and Kisumu fails to develop significantly, due to Jinja's position along the railway to Kenya and smaller economic significance.

Figure 3.4 Cargo Forecast - 2020 Lake Victoria Trade Routes

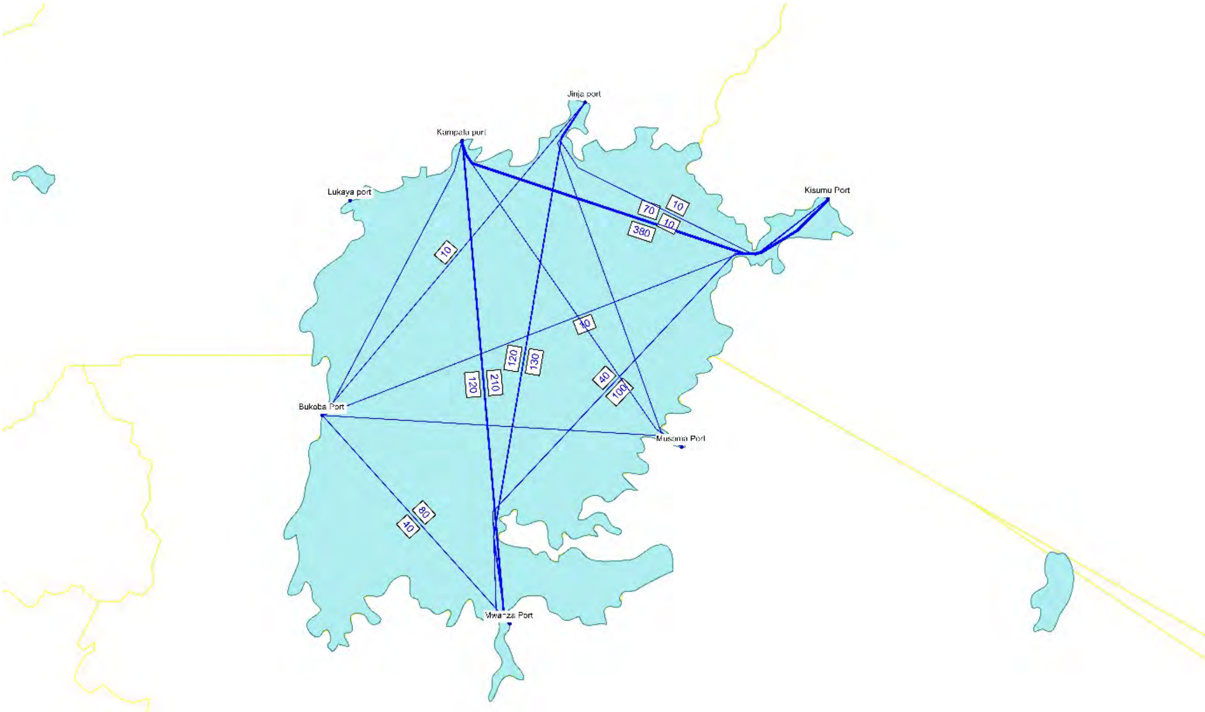


Figure 3.5 Cargo Forecast - 2025 Lake Victoria Trade Routes

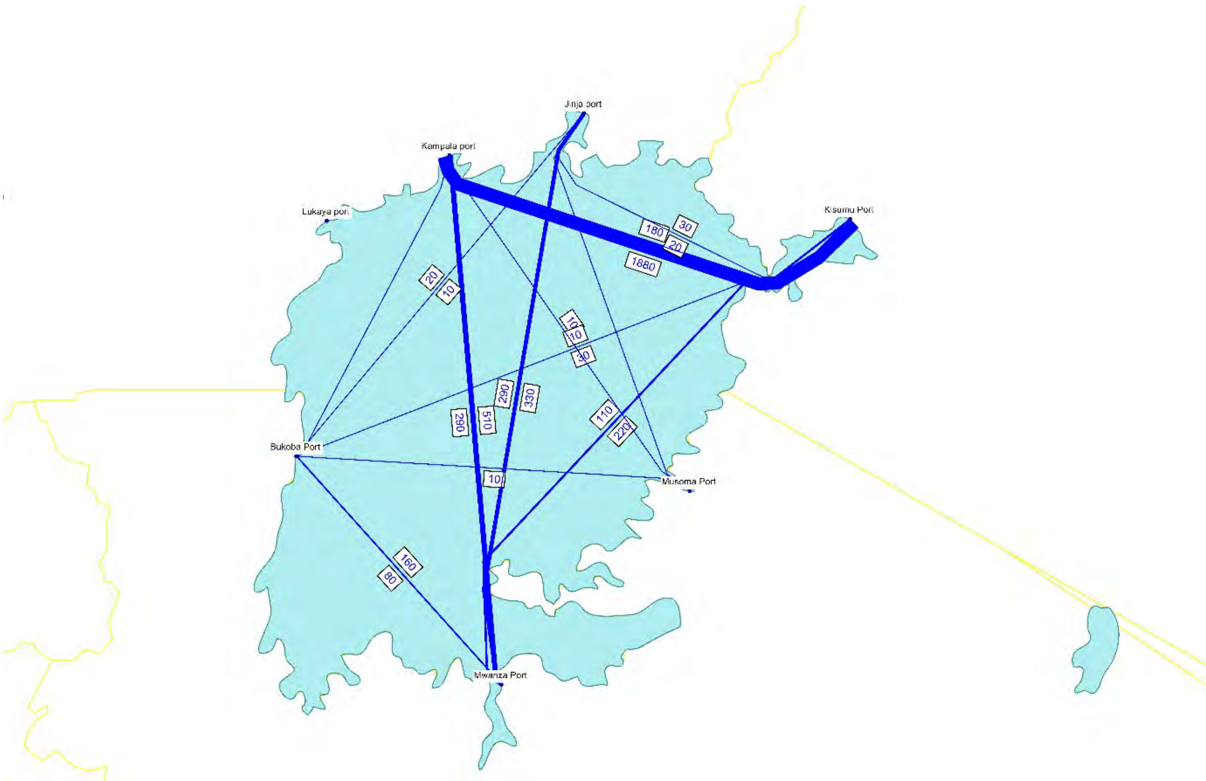


Figure 3.6 Cargo Forecast - 2030 Lake Victoria Trade Routes

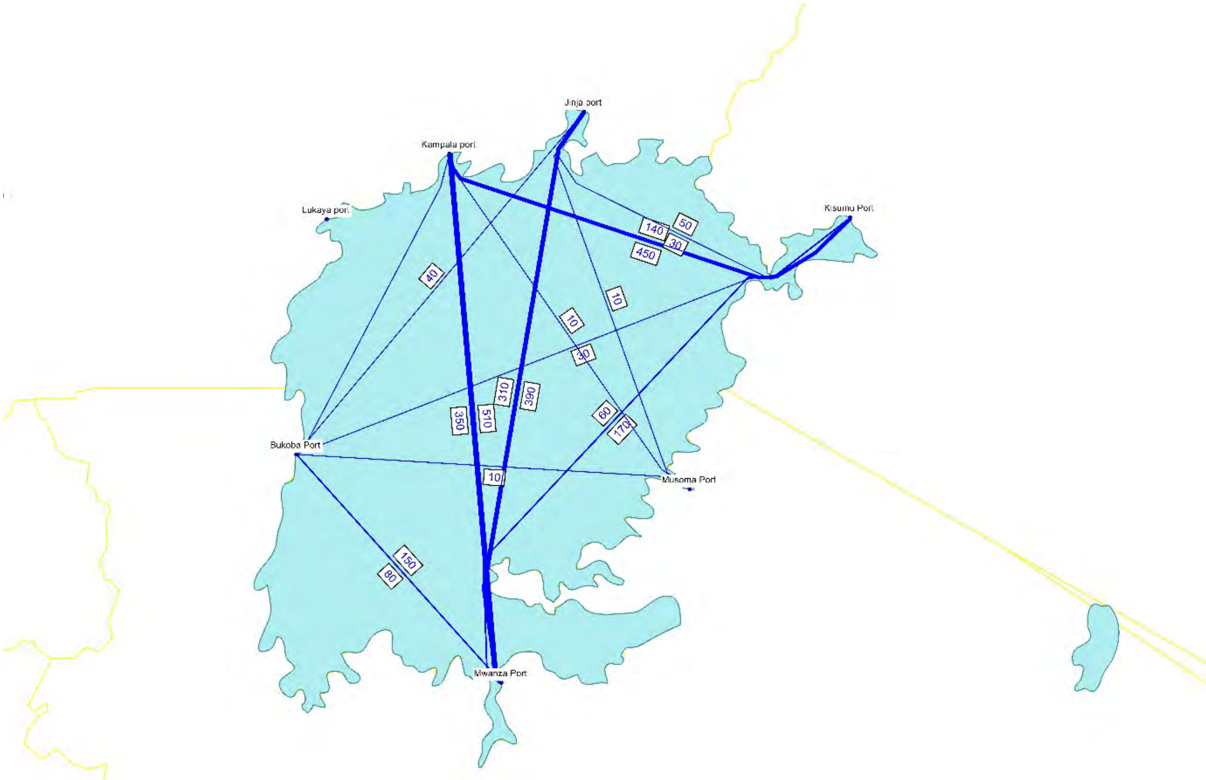
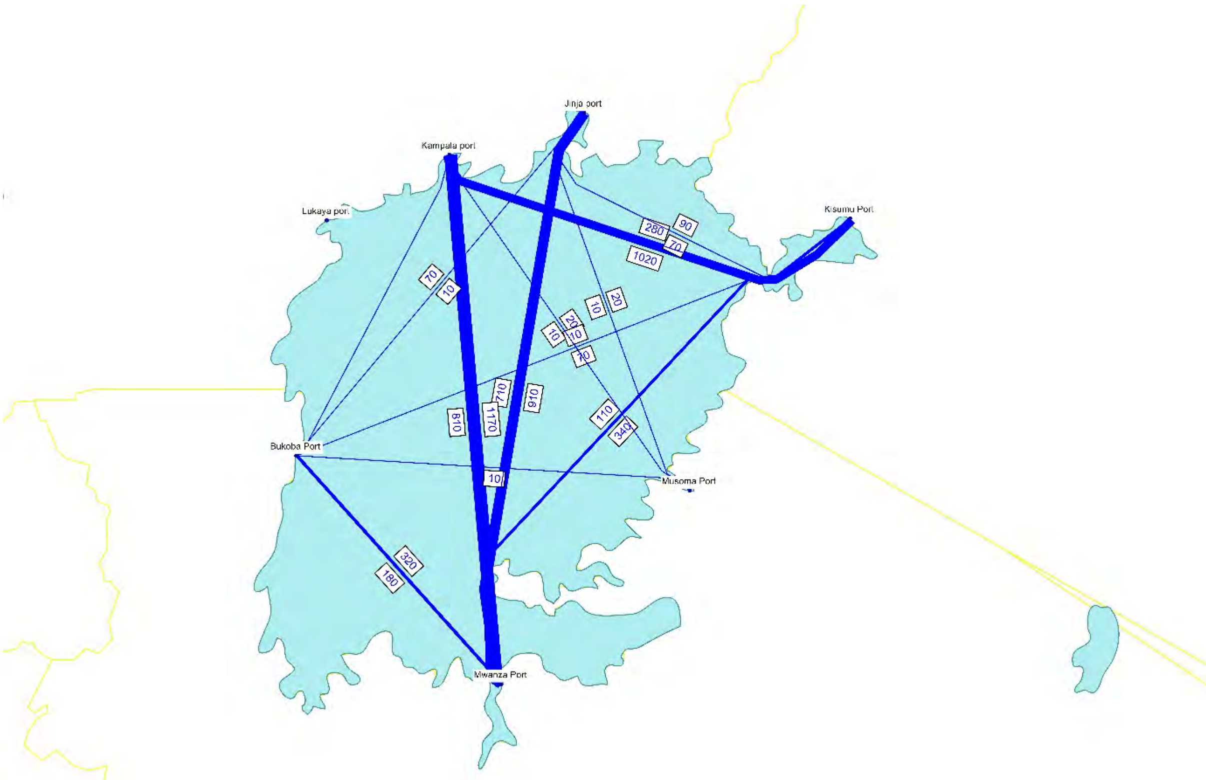


Figure 3.7 Cargo Forecast - 2040 Lake Victoria Trade Routes



3.2 Passenger Demand

The passenger demand section is structured as follows:

- Section 3.2.1 elaborates on the current passenger transport situation on Lake Victoria.
- Section 3.2.2 focuses on the identification, elaboration, and forecasting of multiple lake victoria passenger transport configurations.

3.2.1 Current Situation

Passenger Survey

In order to map the current passenger transport activities on Lake Victoria, a passenger survey was carried out from the 16th to the 23rd of March 2017. This survey included 24-hour surveys at several locations. The surveys consisted of manual counts and interviews of users of the landing sites. In total, 20 landing sites ports were selected for the surveys, out of an initial pre-selection of over 250 landing sites; an overview of the decision tool used to facilitate landing site selection is provided in Appendix V. The following map provides the locations of the selected landing sites.

Figure 3.8 Passenger Forecast - Survey Locations

Boat passengers were interviewed at each of the landing sites to collect information regarding their trip, such as: origin and destination of the total journey, landing site of origin or destination, frequency of the trip, total journey time, journey time on boat, transfer time, costs of trip, trip purpose, mode of access to landing sites, goods and value of goods transported, and general information about the interviewees. A short wiliness to pay questioning was also carried out. However, it should be noted that not all questions were answered by all respondents. The following sections provide an overview of key observations resulting from the survey data. A complete overview of the interviews for the Lyabana landing site has been attached in Appendix VI.

General information on interviewees

In total, 600 people were surveyed, of which 363 were males and 232 were females. The age of the interviewees spans from 16 to 68 years of age. Out of the 600 interviews, only 39 people own a car. 153 of the interviewees were businessmen, 57 were fishermen, and 47 were farmers, with no other occupation exceeding 20 interviewees. The main access mode of transport is by motorbike or taxi. Among the respondents, 121 people travel for business; no other travel purpose exceeded 30 people.

Origin and destination

Locating the stated origins and destinations of the respondents was a difficult process, due to issues with matching the stated location names through available sources and databases. An extra effort was carried out to locate the 1200 landing sites along the Lake that were mentioned. Among the mentioned landing sites, around 15% remain unidentified.

Frequency

The following table indicates the trip frequencies of the respondents. From the results, it can be concluded that many travellers are commuters that make the same trip multiple times a week.

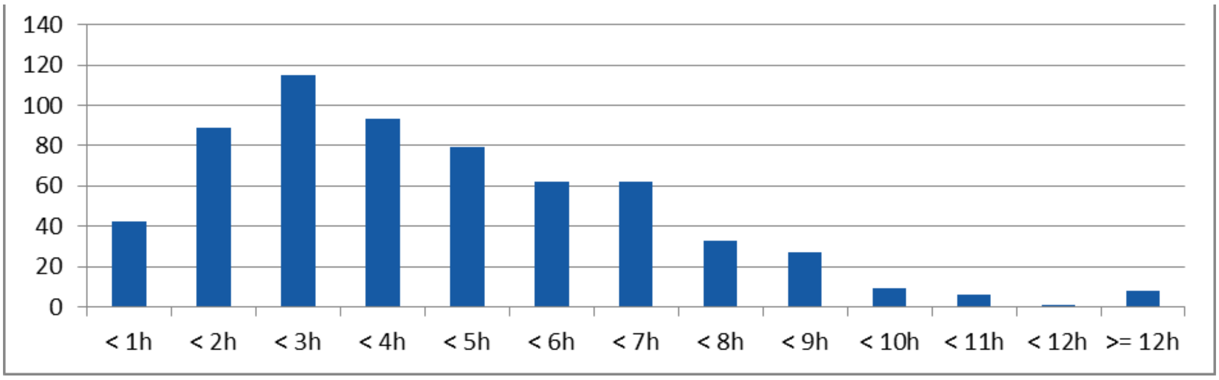
Table 3-8 Passenger Survey - Trip Frequency Table

Frequency	Number of Respondents
once a year or less	3
once a month of less	9
once a week or less	273
twice a week or less	114
once a day or less	158
more than once a day	39

Total Journey time

The reported journey times vary between 5 minutes and 17 hours, with an average of 3 hours and 45 minutes. It seems that it was unclear to some respondents whether the journey time to be mentioned comprised the travel time by boat or the total time of their trip. The following chart presents the distribution of the journey times among the respondents. Most of interviewees using the ferries on the lake make a journey of between 2 and 4 hours.

Figure 3.9 Passenger Survey - Journey Time

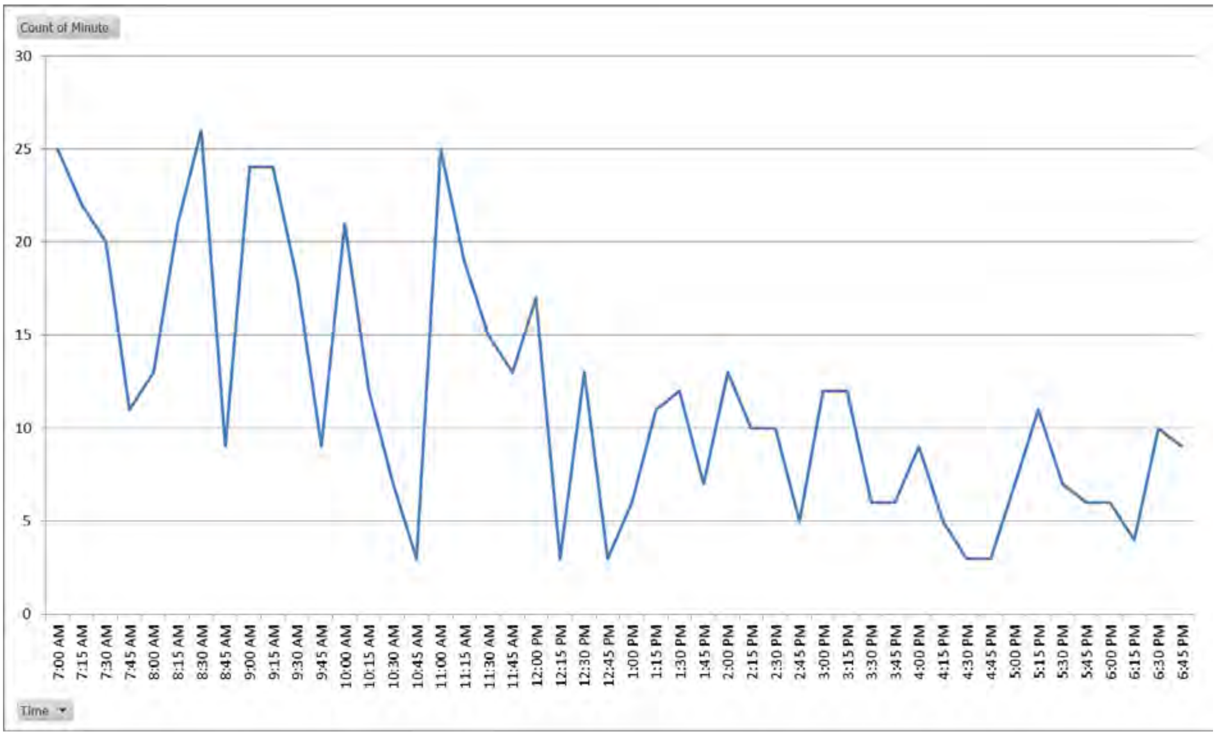


Daily distribution

Figure 3.10 shows the amount of people counted for each 15-minute period between 7 am and 7 pm; as the 24-hour counts were not conducted at all landing sites, a graph covering the full 24-hour period is not considered representative. The period from 7am to 7pm was selected due to the expected peak volumes during this period, thus giving the most insight into travel patterns.

From this graph, it can be concluded that the majority of observed passenger traffic takes place before noon. No clear peak is visible; however, this may be due to the surveyors not being able to completely follow the volumes during this peak period. Additionally, a peak at the end of the afternoon would be expected, as the majority of travellers live on the islands; these commuters travel to the mainland in the morning, and travel back to the islands at the end of the day.

Figure 3.10 Passenger Survey - Daily Passenger Distribution



Seasonality

The seasonality has not been measured. It is believed that tourism will develop in the future, thus creating a higher demand during the touristic period. The calculations below do not take trips related to tourism into account, due to lack of data and the significant uncertainties regarding the development of tourism at the identified landing sites.

Value of commodities

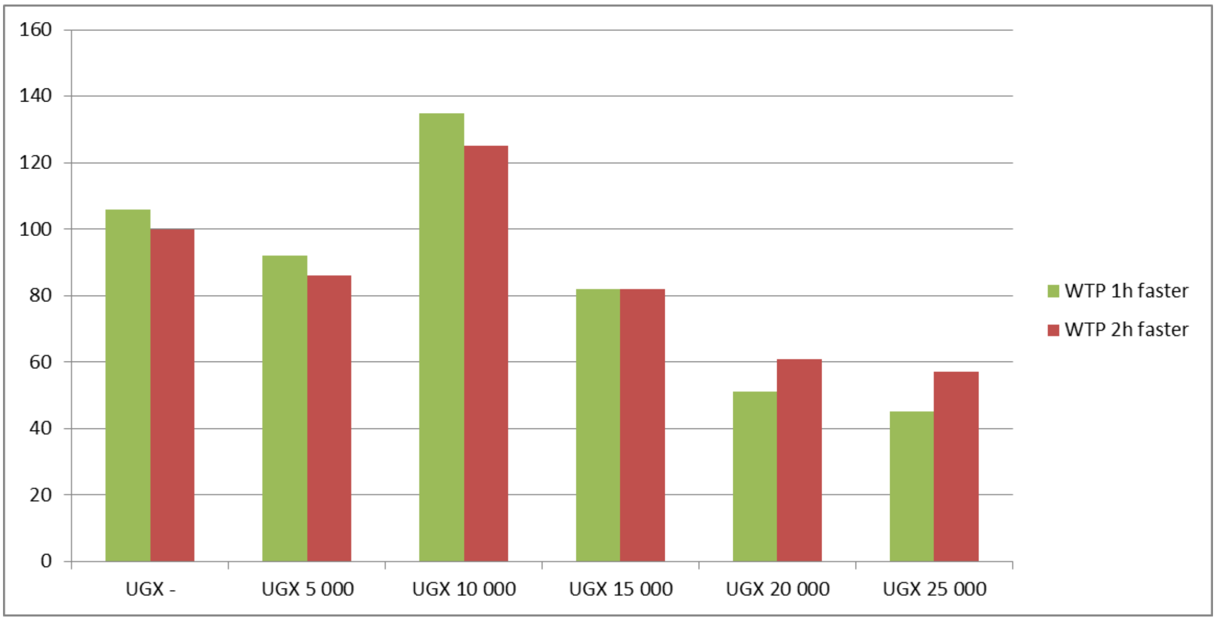
The following chart indicates distribution of the value of commodities transported by interviewees. Most people appear to travel with commodities of a value around USD 10 to 50. People reported on average 1.25 commodities, with 14% of people reporting fish. Rice, sugar, and matoke have each been carried by around 5% of respondents. 40% of people did not report any commodity at all.

Figure 3.11 Passenger Survey - Value of Transported Goods

Willingness to pay

The following chart presents the results of the willingness to pay interview for a travel time gain of one hours or 2 hours. Of all the respondents, 106 are not willing to pay to travel 1h faster, and 100 are not willing to pay to travel 2h faster (out of 600 respondents). The majority are willing to pay around UGX 10,000 for 1 or 2 hours faster transport. 89 inconsistent answers were removed from the dataset (such as people willing to pay less for a time saving of 2 hours than for a time saving of one hour.

Figure 3.12 Passenger Survey - Willingness to Pay Survey



Passenger counts

The map below provides an overview of the traffic counts at each of the locations. The map shows the average daily passenger volumes, comprising both arriving and departing passengers. Subsequently, Figure 3.14 zooms in on the Entebbe area.

Figure 3.13 Passenger Survey - Overview of Passenger Count Volumes

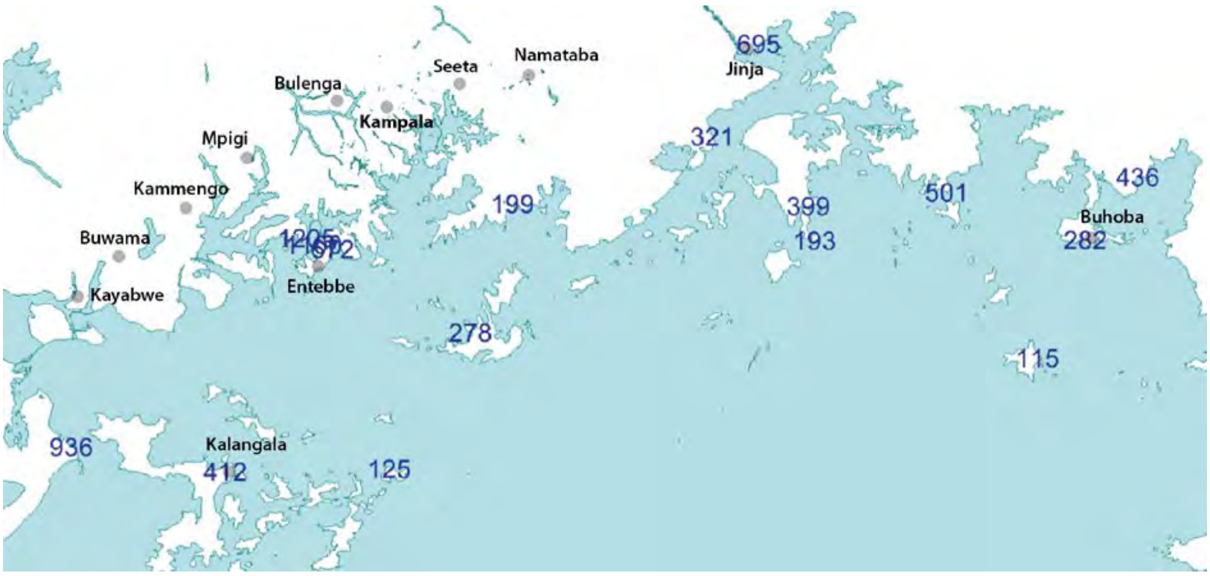


Figure 3.14 Passenger Survey - Passenger Count Volumes Entebbe Area

Base year passenger model

Subsequently, a passenger traffic model was developed in VISUM to model the current situation in line with the average daily survey volumes. This model consists of 2 main parts: the transport offer (multimodal network) and the travel demand (Origin-destination matrix of trips).

Transport offer (multimodal network)

The modelled network is multimodal and includes road and waterborne transport. The following connections were modelled in the network:

- “Official” ferry services.
- “Unofficial” ferries, as identified from surveys (usually wooden boats).
- “Unsurveyed” ferries, which are necessary to connect populated isolated parishes but were not identified in the survey - these are treated in a similar way as unofficial ferries.
- Roads imported from Openstreetmap. No distinctions are made between bus, motorcycle or private car transport - an average speed was assumed.

Figure 3.15 provides an overview of the total modelled network. Subsequent maps zoom in on the waterborne routes in the various regions of the lake.

Figure 3.15 Passenger Demand - Base Year Model – Full Overview

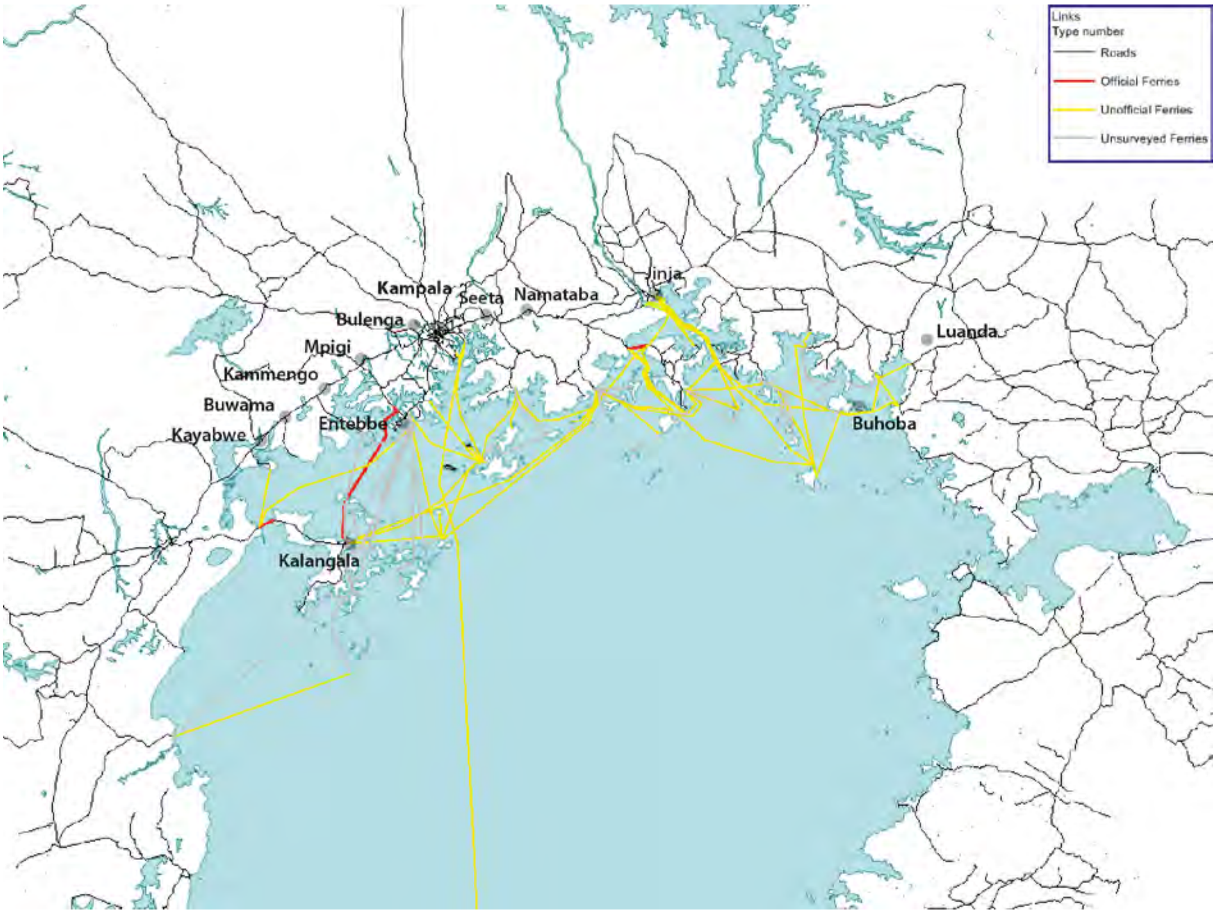


Figure 3.16 Passenger Demand - Base Year Model – Lake Overview

Figure 3.17 Passenger Demand - Base Year Model – Kalangala Islands

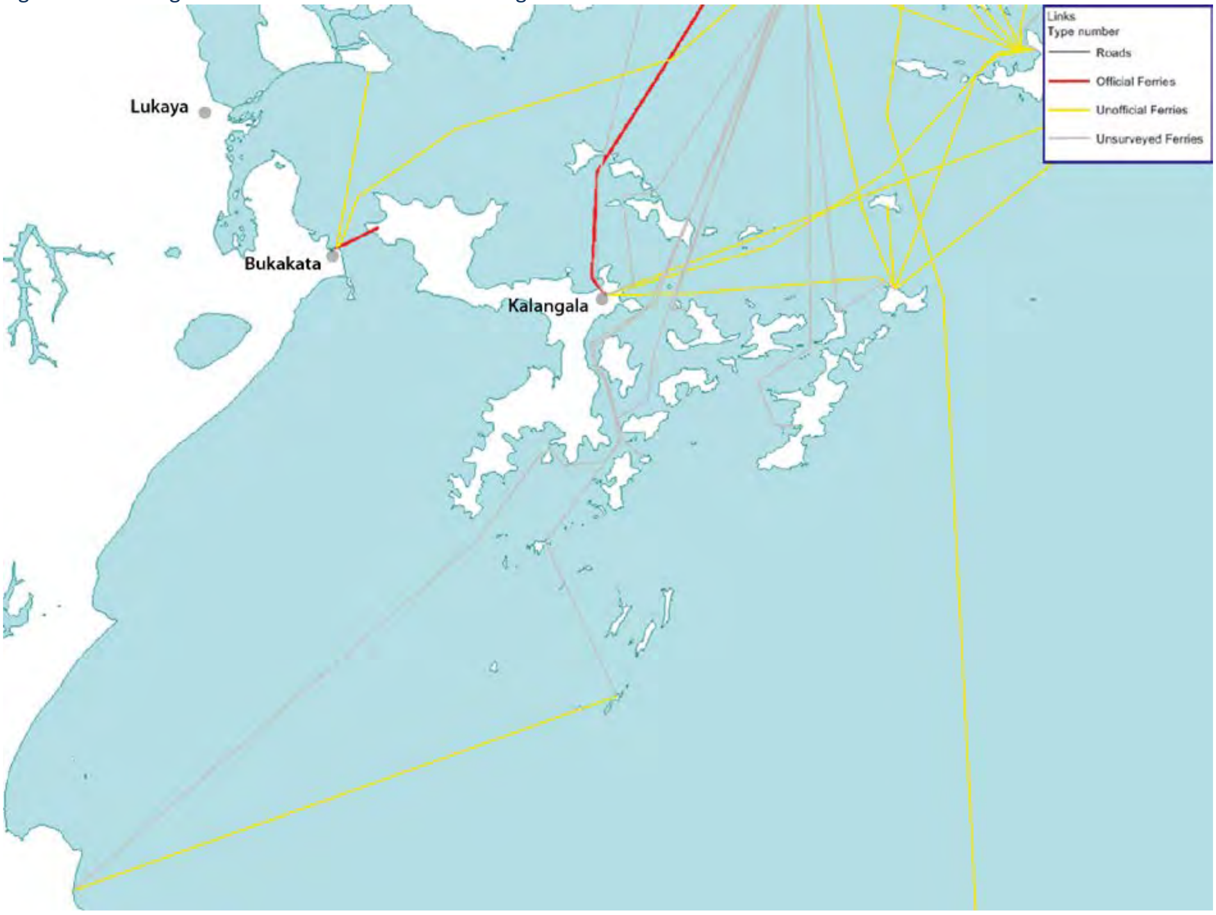


Figure 3.18 Passenger Demand - Base Year Model – Buvuma and Sigulu Islands

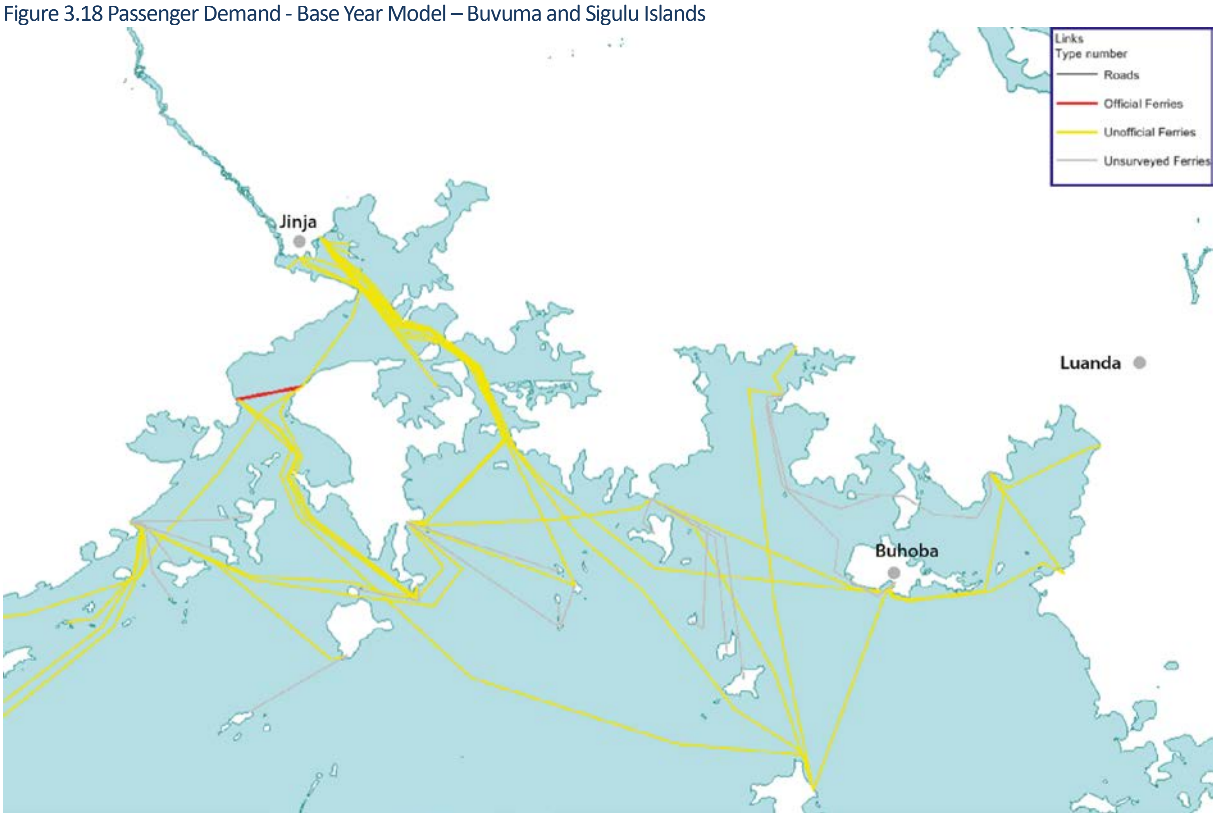
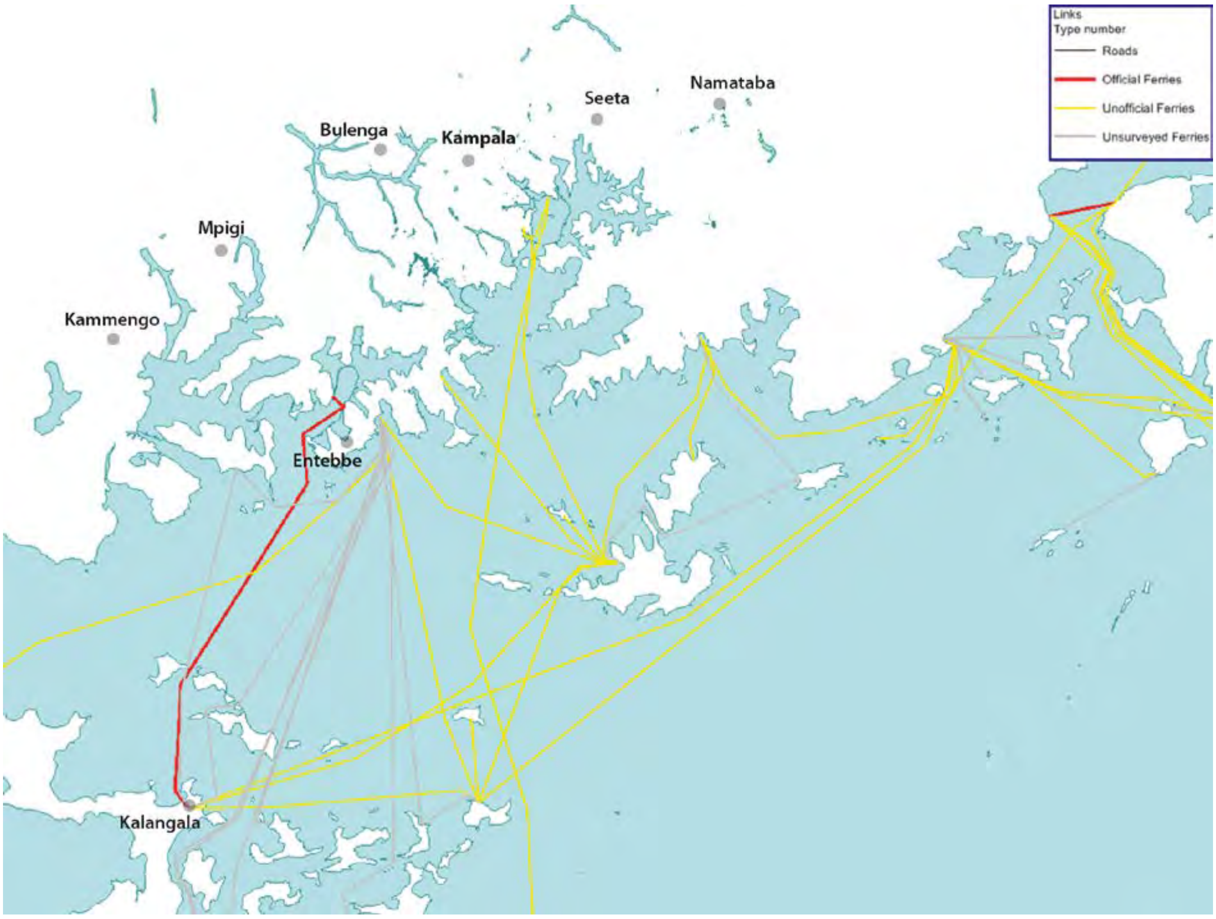


Figure 3.19 Passenger Demand - Base Year Model – Kampala Area



Each link has been attributed a generalised speed, taking into account the actual speed of the service, its cost, and its attractiveness. For instance, official ferries are made more attractive than informal services as they offer an "international standard" service (standard safety equipment, toilets, refreshments bar, etc). The following table indicates the main assumptions for the generalised speeds modelled per type of link/node. The parameters for official ferries are based on obtained information; other parameters were calibrated to best fit the results from the counted survey data points.

Table 3-9 Passenger Demand – Model Generalised Speed Assumptions

Item	Value
Travel Speeds	
Outside Urban Areas	75% of Open Street Map (OSM) Speed Limit
Inside Urban Areas	15% of OSM Speed Limit
Official Ferries	16 knots*
Unofficial Ferries	8 knots
Boarding / Off-boarding Times	
Official Ferries	15 min
Unofficial Ferries	30 min

*This is a conservative assumption, as the ferries proposed are fast ferries that operate at speeds of approximately 25 knots (approximately 45 kmph). For configuration scenario 3, fast ferries with a speed of 30 knots are assumed to be deployed.

Travel demand

The travel demand was modelled as an origin - destination matrix of passenger trips. This OD matrix was built based on the population census data of 2014[2] and the results of the surveys (travel time distribution); subsequently, the model was calibrated by comparing model outputs with the manual counts at landing sites.

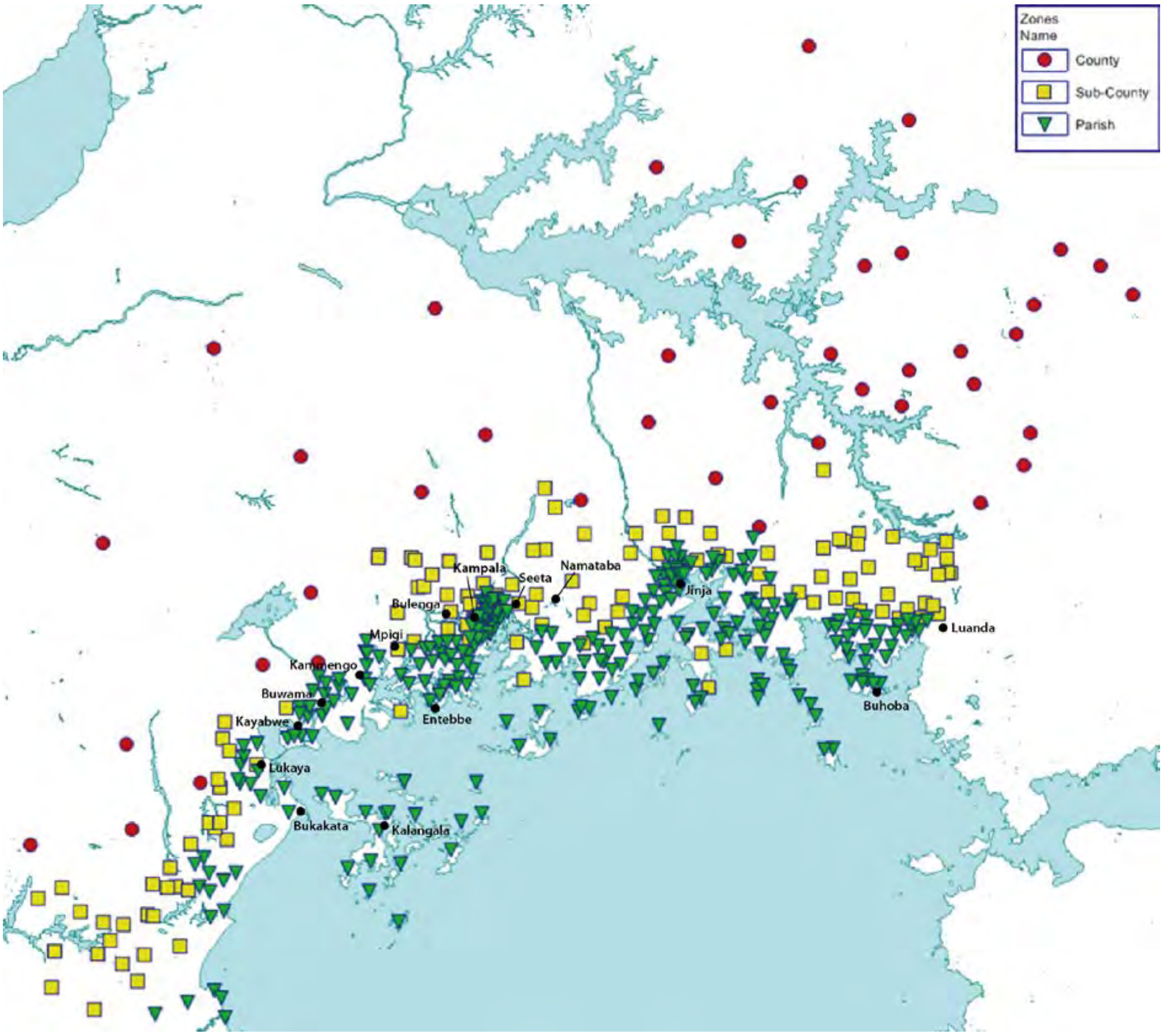
The detail for defining the zones in the model depends on the respective zones' proximity to the lake's shores:

- District level for the districts of the Eastern and Central regions of Uganda.
- Sub-district level for all districts near Lake Victoria.
- Parish level for the districts bordering and on Lake Victoria.

The following maps provide an overview the zones in the model, using the following colour code:

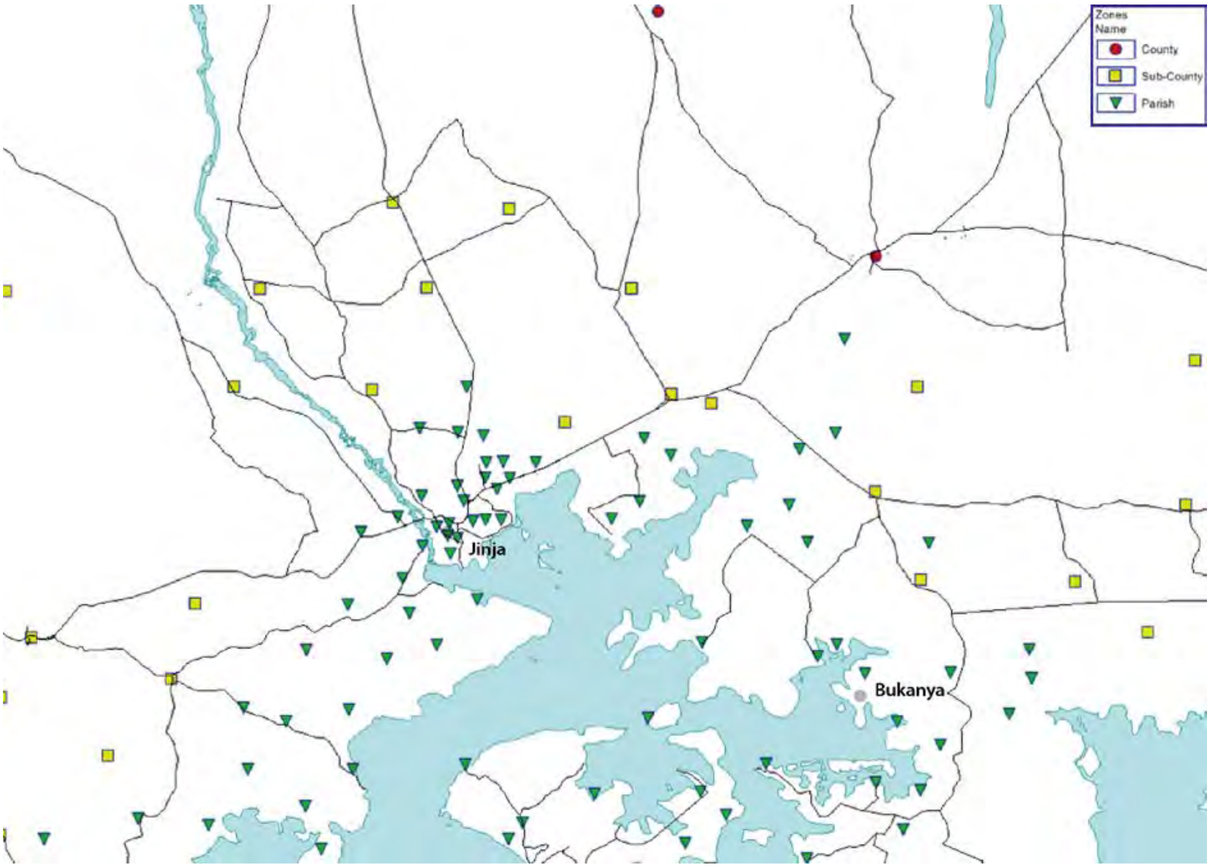
- District level: red
- Sub-district level: yellow
- Parish level: green

Figure 3.20 Passenger Demand - Model Zones - Overview



[2] Source: http://www.ubos.org/onlinefiles/uploads/ubos/NPHC/Population%20by%20Parish,%20National%20Population%20and%20Housing%20Census%202014.pdf for population, http://www.lcmt.org/ for localisation

Figure 3.21 Passenger Demand - Model Zones - Jinja Region



The travel demand of passenger trips was generated via a 3-step model:

- Trip generation: The number of travellers was estimated for each zone (see section 3.2.2).
- Trip distribution: A gravity model based on the travel time was applied to build the OD-matrix based on the parameters extracted from the passenger survey, taking into account the total travel time of the journey for each O-D couple. This matrix was calibrated after the assignment to the multimodal network (mode choice + assignment) based on the traffic counts (see elaboration below).
- Mode Choice and Route Choice: The mode choice and the route choice are both coded into the network: no new matrix is being calculated (see elaboration below).

Mode choice and route choice

The mode choice and route choice are made during the assignment. Passengers assigned to the network choose their optimal route according to the parameters of the links and nodes in the network. The modal choice is therefore made between roads, official and unofficial ferries, based on the generalised time of each of these options (taking into account the actual travel time, the cost and attractiveness of service, as summarised in Table 3-9). The preferred route for the passengers is determined based on the generalised time of each possible route (with costs expressed in units of time).

Base Model calibration

The model was calibrated according to our experience of the ferry usage and the traffic counts carried out during the survey week. The calibration module of VISUM, TFlowFuzzy, was used to adapt the OD-matrix to the traffic counted at the surveyed landing sites.

Base Model Results

The following figure provides an overview of the passenger flows reproduced in the traffic model after calibration for a typical day (current situation). Only routes with 10 or more passengers are shown on the map.

Figure 3.22 Passenger Demand - Calibrated Base Year Model - Daily Passenger Flows

3.2.2 Forecast

Due to the significant amount of potential landing sites and ferry routes, 3 ferry service configurations have been developed. The scenarios were developed based on the surveys, the resulting base year model flows, and a review of the following studies:

- Investment Plan for Lake Connectivity (KAIKA Invest, 2015).
- Lake Transport Study (Royal Haskoning, 2014).
- Lake Victoria Transport Plan (Infraco and Eleqtra, 2016).

The 3 identified scenarios are summarised in the table below. Subsequently, the forecasts for the 3 identified ferry service configurations are discussed, following an elaboration of the general demand growth assumptions applied in the model.

Table 3-10 Overview of Ferry Configurations

Configuration	Characteristics of Configuration
Configuration 1	• Similar to the network configuration presented in the 2015 Investment Plan for Lake Connectivity
Configuration 2	• Based on survey results and demographic data • Aimed at providing an equal spread between the eastern, central, and western regions of Lake Victoria to optimize connectivity
Configuration 3	• Similar to configuration 2, but with additional routing optimisations (e.g., routes with more than 2 ferry stops, in order to minise CAPEX) • Additional “Airport Express”, which connects Kampala city (Port Bell) to Kampala airport (Kigungu landing site)

Demand Growth Assumptions

The scenarios are initially modelled for the year 2040 (long term). The growth in travel demand for each zone in the model was estimated considering:

- the population growth by district between the 2002 and 2014 censuses and
- the UN country level population forecast for Uganda (World Population Prospects 2015, medium variant).

Based on the calculated growth rate per district, the calibrated OD-matrix from the base model was modified to create a corrected demand matrix for the year 2040. Based on the results for 2040, the travel demand for each route was extrapolated for the target-years 2020, 2025, 2030, and 2035. The interpolation is based on the forecasted population growth for each of these periods.

Scenario 1

Routes and Assumptions

Scenario 1 was developed based on the ferry routes suggested in the KAIKA Invest study. For this scenario, the official ferries remain unchanged from current situation (2017); additionally, the following new official ferries routes are proposed:

- Kasenyi - Koome
- Koome - Damba
- Bwondha - Jagusi
- Lugala - Sigulu
- Jinja - Port Bell

Wooden boat services are to be halted on these new official ferry routes. Instead, the wooden boats can be used to provide short-distance connections to the hub landing sites that are connected by the new official ferries. The principle of transport hubs is applied; informal short-distance ferries ensure connectivity for all parishes to the mainland with at most 1 transfer to an official ferry. In the current situation, most parishes are assumed to be accessible directly from the mainland, but this is no longer possible in scenario 1. This theoretical scenario may be complex to implement in practice due to the "informal" character of the unofficial ferry, meaning that it may be complex to redeploy these wooden boat ferries.

Additionally, a 25% road speed reduction is incorporated in the 2040 model compared to today, to account for the expected additional congestion on the road network resulting from economic growth. Moreover, the road network remains unchanged compared to the current situation.

The map below illustrates the modelled network for scenario 1.

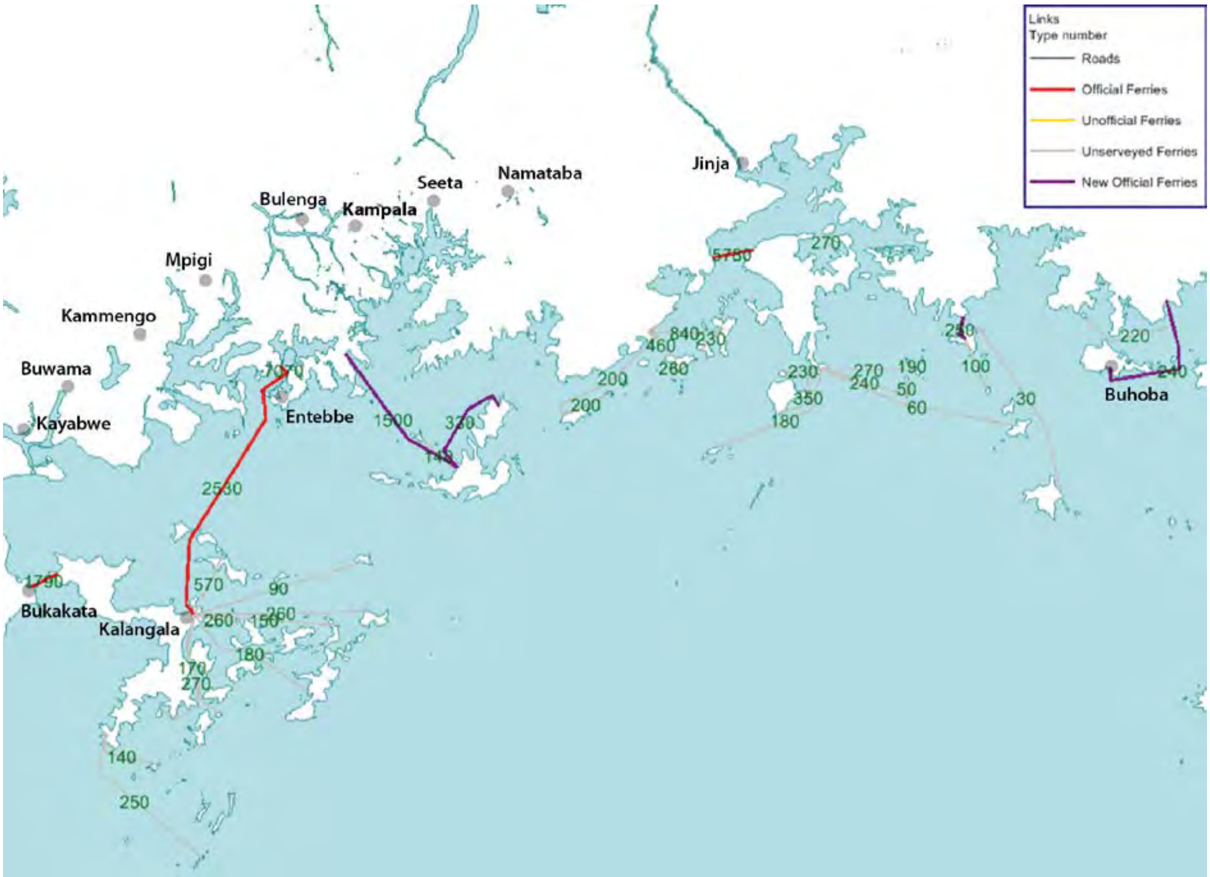
Figure 3.23 Passenger Demand - Scenario 1 - Overview

<u>Results</u>

Figure 3.24 provides an overview of the 2040 forecasted passenger flows by ferry routes for scenario 1, showing the average daily two-way passenger volumes. The suppression of the direct informal ferries between the islands and the mainland generates high passenger demand for the existing and planned official ferry routes between the mainland and the islands. For example, passenger demand on the MV Kalangala service is estimated to increase by a factor 13 and the Bukakata – Luku service volumes are estimated to double.

However, the official ferry route between Jinja and Port Bell attracts less than 10 passengers a day on average, mainly due to the long journey time from port to port (with an assumed ferry speed of 30 km/h) and the fairly poor connection of Port Bell with Kampala centre.

Figure 3.24 Passenger Demand - Scenario 1 - 2040 Results



The table below presents the 2040 demand for scenario 1 for each route, as well as the interpolation for the other target years. The volumes are presented as the average daily two-way passenger volumes. Ferry routes with less than 10 passengers per day are omitted.

It can be observed that the highest demand routes are very short ferry routes; these routes are the existing Entebbe (Kyanvubu – Nakiwogo) crossing and the access to Buvuma Island (Kiyindi – Buvuma). Additionally, the current privately-operated ferries (MV Kalangala (Lutoboka – Nakiwogo) and MV Ssese and MV Pearl (Bukakata – Luku)) generate substantial passenger demand.

Table 3-11 Passenger Demand - Scenario 1 Forecast Results

Route	Unit	2020	2025	2030	2035	2040
Bukakata – Luku*	Passengers per Day	1,010	1,179	1,366	1,571	1,789
Buvuma – Kiyindi**	Passengers per Day	3,261	3,807	4,412	5,072	5,778
Bwondha - Dagusi	Passengers per Day	142	166	192	221	252
Nakiwogo – Lutoboka***	Passengers per Day	1,430	1,670	1,935	2,224	2,534
Kasenyi – Zingoola	Passengers per Day	845	986	1,143	1,314	1,497
Kyanvubu – Nakiwogo**	Passengers per Day	3,990	4,658	5,399	6,206	7,070
Lugala - Matolo	Passengers per Day	137	160	185	213	242
Total	**Passengers per Day**	**10,815**	**12,625**	**14,632**	**16,820**	**19,162**

*Existing service operated by KIS; **Existing service operated by UNRA; ***Existing service operated by National Oil Distributors

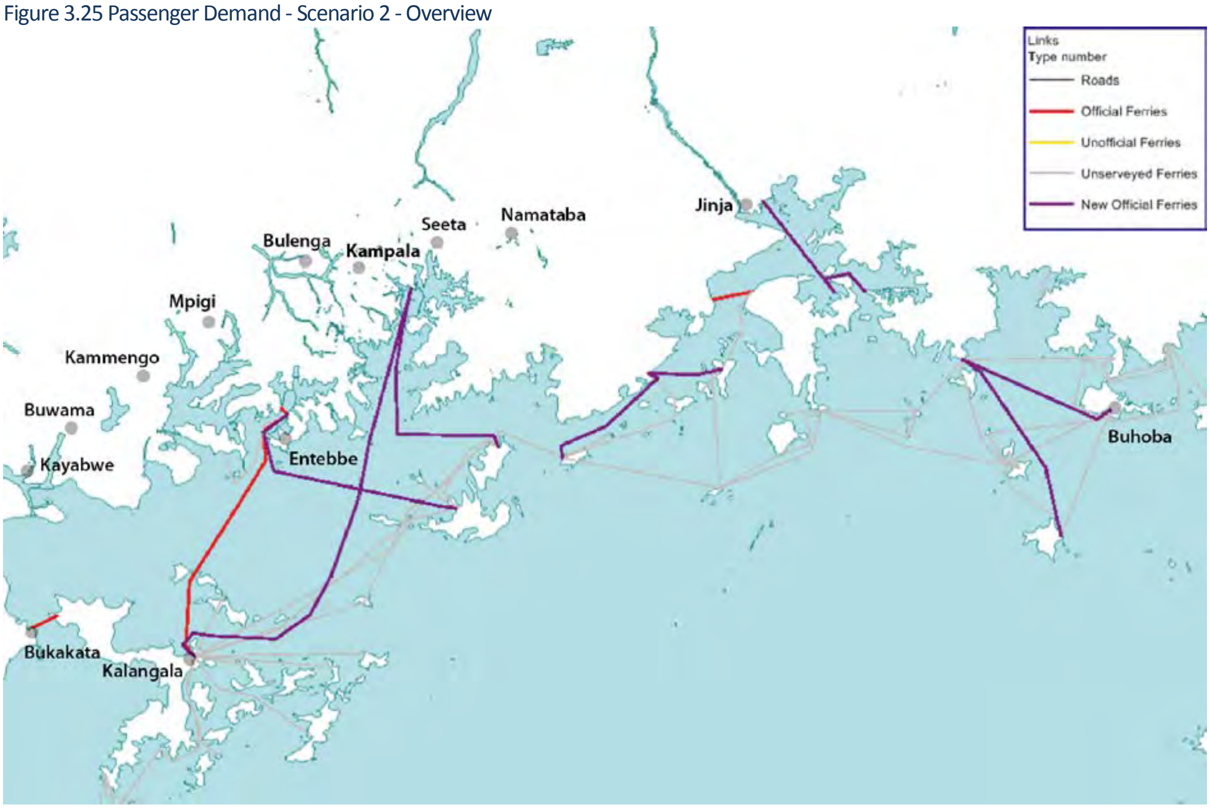
Scenario 2

Routes and Assumptions

Scenario 2 was developed based on the results of scenario 1 and an in-depth analysis of the populations numbers for the different island(group)s, allowing for the identification of high potential connections to become new official ferry (taking into account current mainland ports). The existing official ferries remain unchanged from current situation (2017). Wooden boats ("unsurveyed ferries") fill the gaps left by the official ferries and guarantee a connection to the official ferry hubs from each island parish. This strategy means that direct routes from Port Bell to the most populated islands are to be proposed as well as from Jinja.

Similar to scenario 1, it is further assumed that road traffic will be 25% slower in 2040, as compared to today, in order to incorporate the additional congestion on the road network. Moreover, the road network remains unchanged compared to the current situation. The map below illustrates the modelled network for scenario 2.

Figure 3.25 Passenger Demand - Scenario 2 - Overview



Results

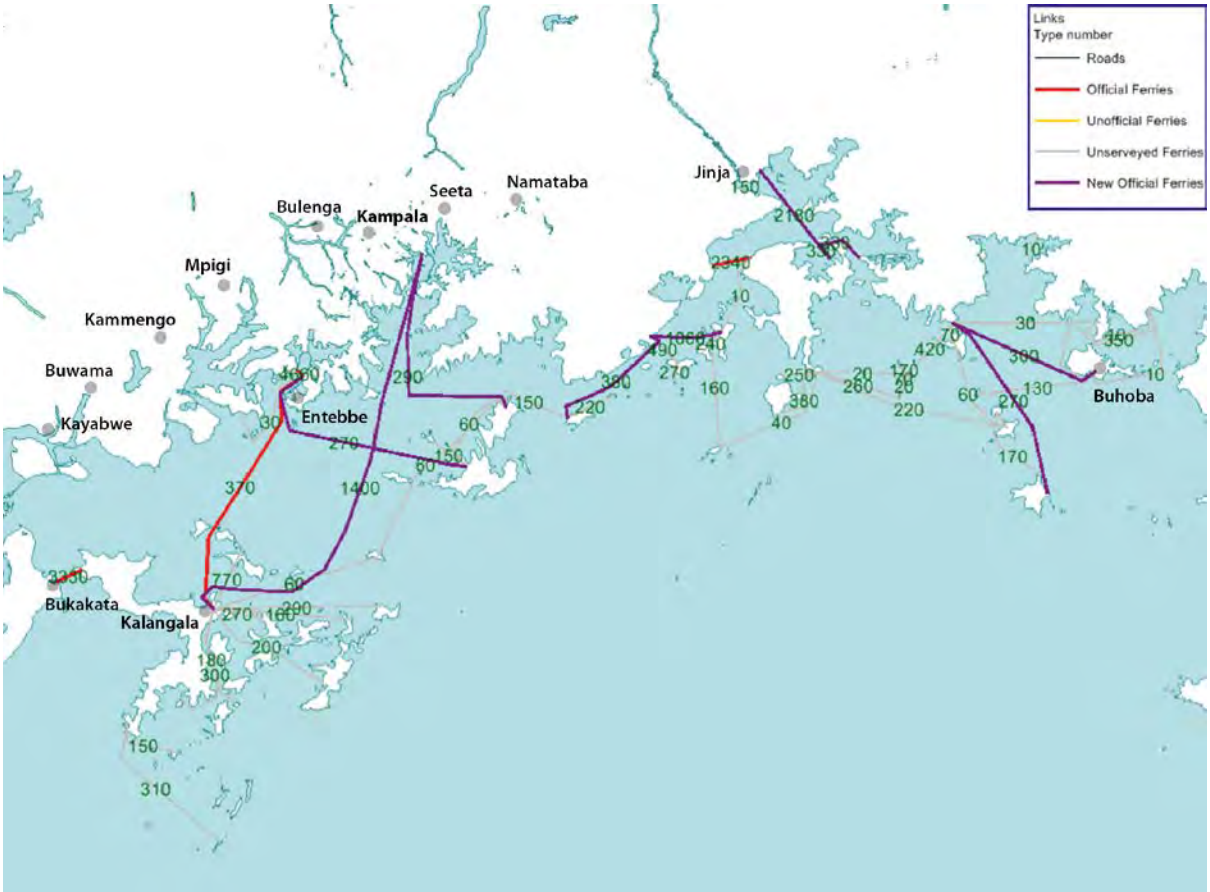
In scenario 2, all the modelled official ferry routes appear to fulfil a need for travel in 2040, as they are estimated to attract higher passenger volumes than the current MV Kalangala service. Figure 3.26 presents the average daily two-way passenger volumes.

This scenario allows a better spreading of the travel demand from the Kampala region (including Entebbe). The existing ferry line from Entebbe sees a moderate growth in comparison to scenario 1. The direct route Port Bell-Kalangala appears to the most attractive route of all, excluding the existing short-range UNRA ferries. The routes from Jinja to the Buvuma Island and from Ssenyi to Buziri also attract a substantial number of passengers.

Some unofficial ferry routes, such as the link between the Lulamba Island and the Kalangala Island, are also estimated to cater for large passenger flows in 2040. Hence, it is concluded that the Lulamba Island could benefit from a direct link to the mainland. Other unofficial ferry links cover relatively short distances and do not require the level of comfort and speed of the official ferries.

It is noted that, with the new official link between Kampala and Kalangala, competition arises between this link and the link between Nakiwogo and Kalangala (as can be observed from the figure below). The cannibalisation of passenger volumes to/from Kalangala island may be undesirable, or even impossible if exclusive licences are in place for the MV Kalangala service. Hence, competitive routes are not advised.

Figure 3.26 Passenger Demand - Scenario 2 - 2040 Results



The table below presents the 2040 demand for scenario 2 for each identified route, as well as the interpolation for the other target years. The volumes are presented as the average daily two-way passenger volumes.

Table 3-12 Passenger Demand - Scenario 2 Forecast Results

Route	Unit	2020	2025	2030	2035	2040
Bukakata – Luku*	Passengers per Day	1,877	2,192	2,540	2,920	3,326
Buvuma – Kiyindi**	Passengers per Day	1,321	1,543	1,788	2,055	2,341
Buwanzi - Masese	Passengers per Day	1,229	1,434	1,662	1,911	2,177
Buwanzi - Namoni	Passengers per Day	188	219	254	292	332
Buziri - Ssenyi	Passengers per Day	599	700	811	932	1,062
Bwondha – Golofa	Passengers per Day	153	179	207	238	271
Bwondha – Matolo	Passengers per Day	172	201	233	268	305
Port Bell – Damba Island	Passengers per Day	166	194	225	258	294
Nakiwogo – Lutoboka***	Passengers per Day	208	243	282	324	369
Port Bell – Kalangala	Passengers per Day	789	922	1,068	1,228	1,399
Kyanvubu – Nakiwogo**	Passengers per Day	2,631	3,072	3,560	4,092	4,662
Ssenyi – Lwaji Island	Passengers per Day	214	250	290	333	379
Nakiwogo - Zingoola	Passengers per Day	153	179	208	239	272
Total	**Passengers per Day**	**9,702**	**11,326**	**13,127**	**15,089**	**17,190**

*Existing service operated by KIS; **Existing service operated by UNRA; ***Existing service operated by MV Kalangala

Scenario 3

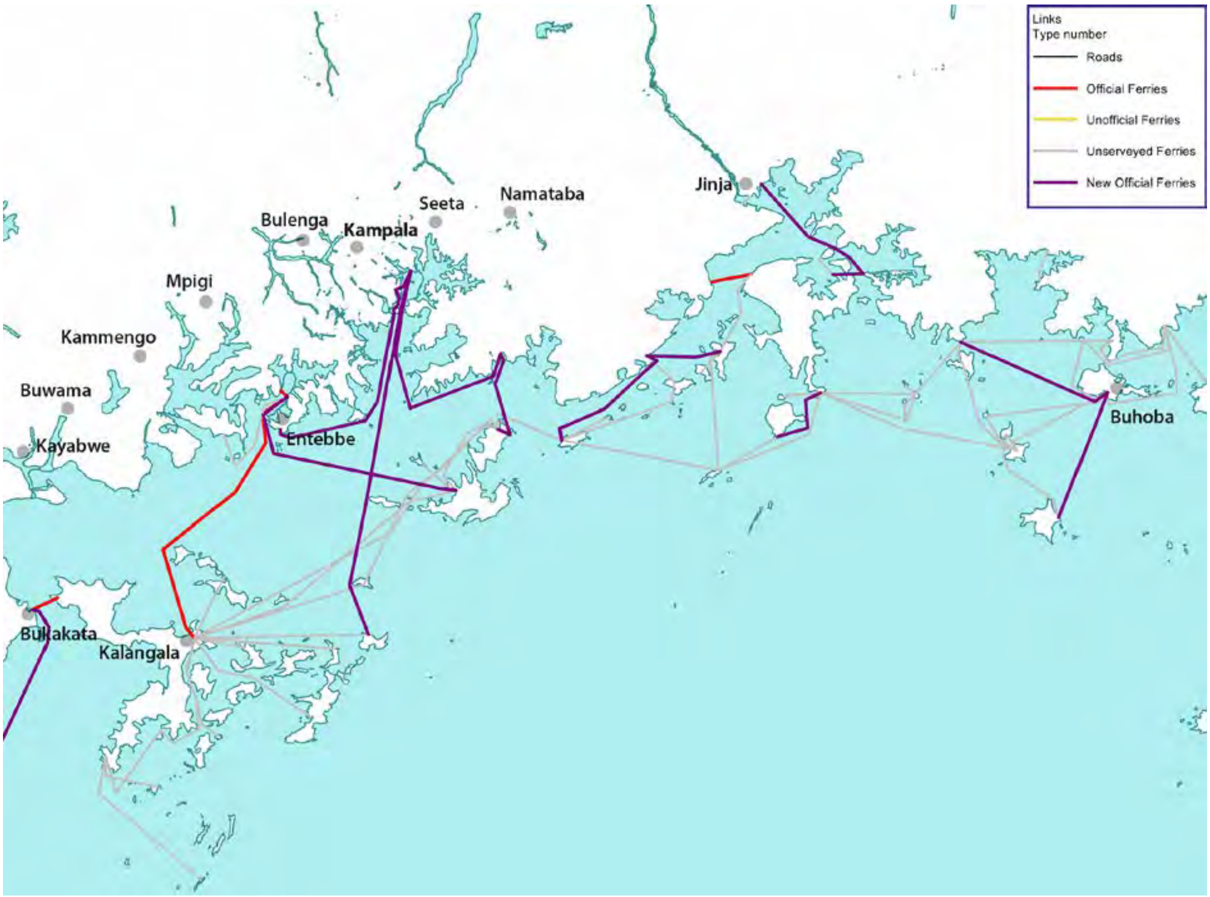
Routes and Assumptions

Scenario 3 has been built on the scenario 2 configuration, with the following additions and alterations to optimize the efficiency of the network:

- A route between Port Bell and Namisoke replaces the route from Port Bell to Lutoboka, in order to avoid cannibalisation of the Port Bell – Lutoboka route with the existing Nakiwogo – Kalangala service.
- Addition of a route between Katosi and Damba, which is combined with the Port Bell – Damba service from scenario 2 (with a 15 minute layover time in Katosi).
- Addition of a route between Bukakata and Kasensero.
- Combination of the Bwondha – Matolo and Bwondha – Golofa services into 1 service (with a 15 minute layover time in Matolo). Considering the locations of these landing sites, it is efficient to integrate the services; additionally, the combined passenger volumes (e.g., 2020: 153 + 172 = 325 passengers two-way, which equals 163 passengers one-way) can be accommodated on 1 medium sized fast passenger ferry.
- Combination of the Masese – Buwanzi and Buwanzi – Namoni services into 1 service (with a 15 minute layover time in Namoni).
- Addition of an "Airport Express", which connects Kampala city (Port Bell) to Ggaba and Kampala airport (Kigungu landing site). This is the only "mainland to mainland" connection in configuration 3.
- All new official ferry services will deploy fast ferries, which travel at a speed of 30 knots. This is substantially faster than the regular ferries assumed for configurations 1 and 2, which sail at a speed of 16 knots. This is mainly due to the inclusion of services with multiple ferry stops, as these longer routes require faster ferries to remain competitive vis-à-vis unofficial ferries (wooden boats).

Figure 3.27 on the next page illustrates the modelled network for scenario 3.

Figure 3.27 Passenger Demand - Scenario 3 - Overview



Subsequently, the figures below provide more detailed overviews of the modelled ferry routes, including the names of the selected landing sites.

Figure 3.28 Passenger Demand - Scenario 3 - Detailed Overview 1

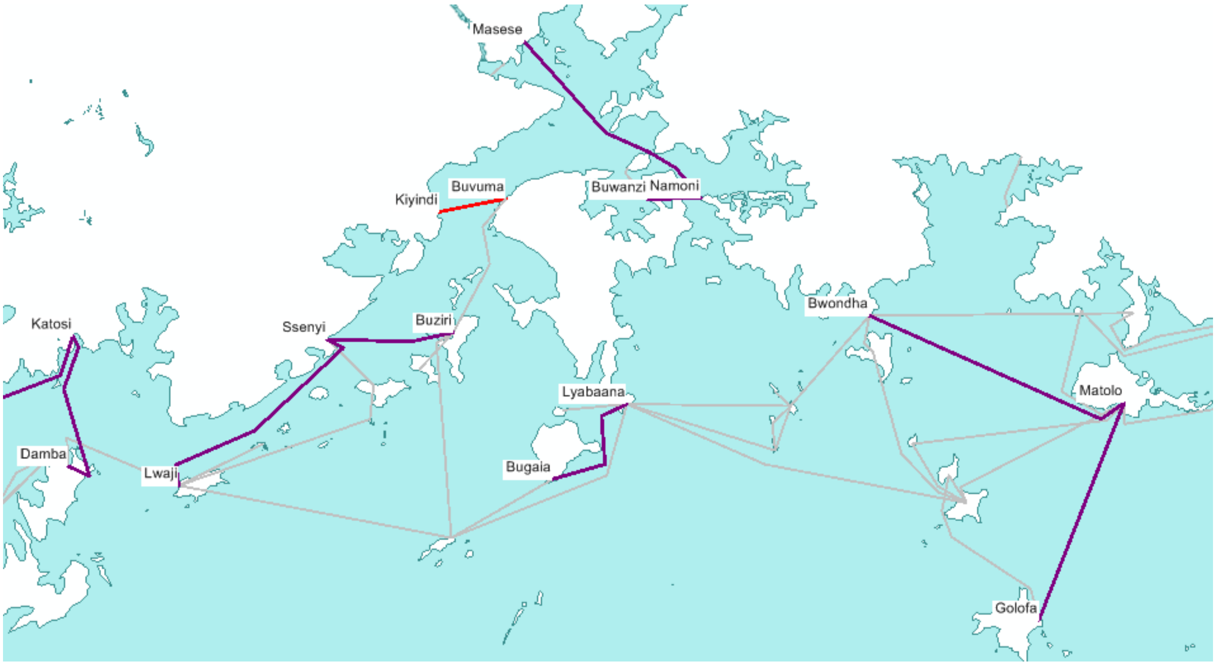


Figure 3.29 Passenger Demand - Scenario 3 - Detailed Overview 2

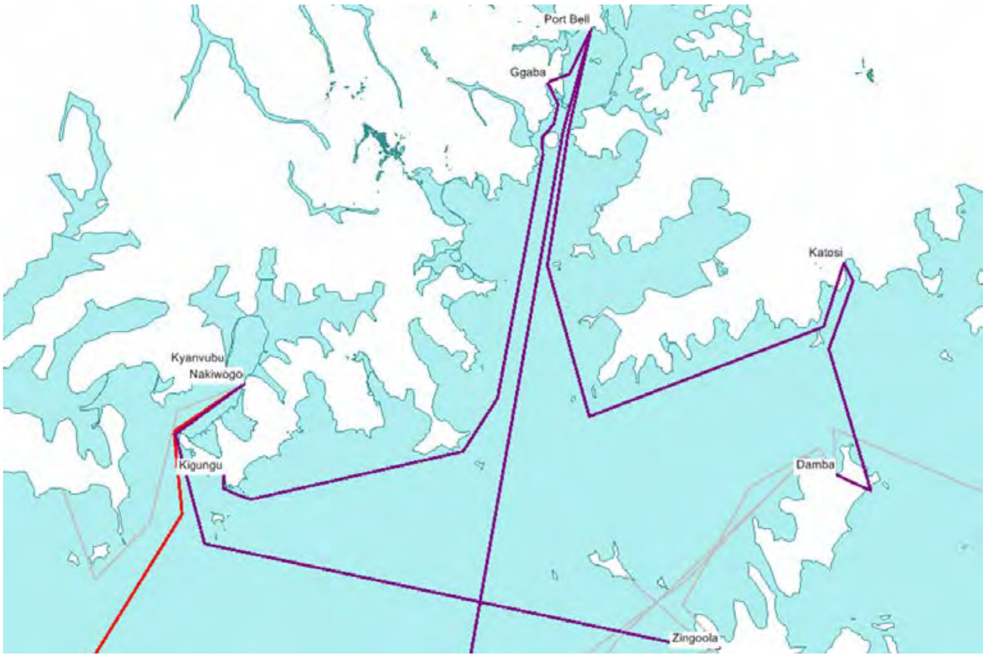


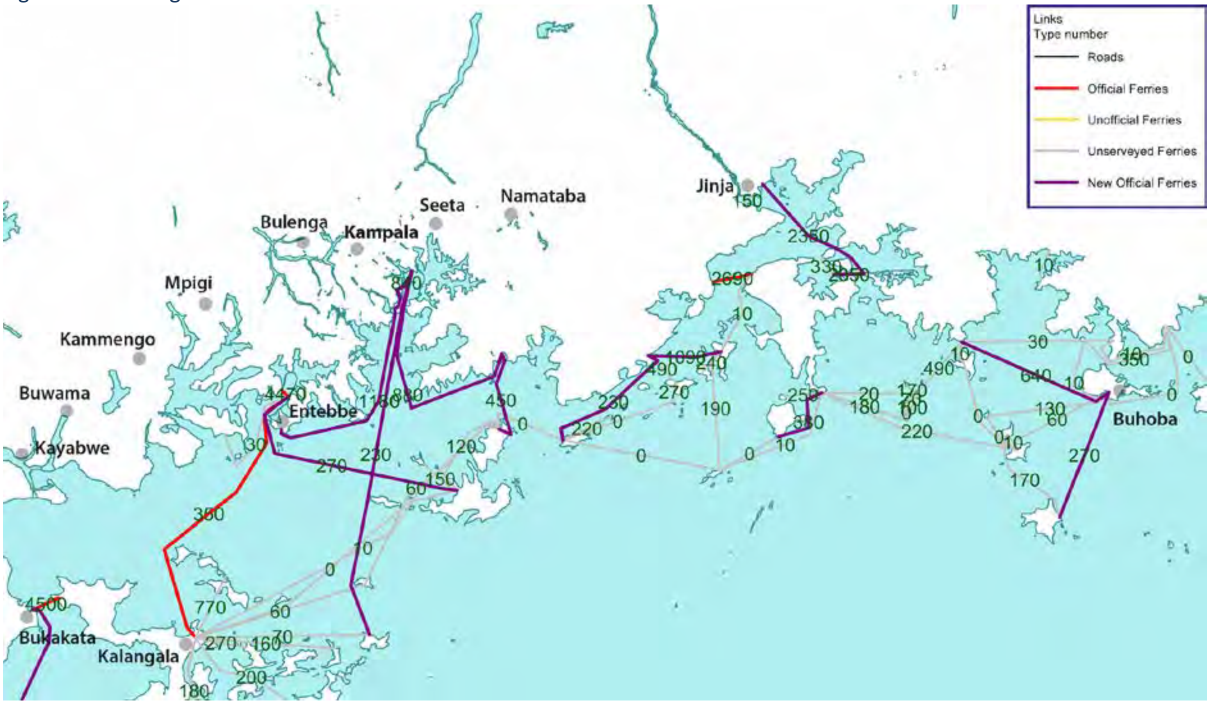
Figure 3.30 Passenger Demand - Scenario 3 - Detailed Overview 2

<u>Results</u>

Figure 3.28 on the next page shows the results for scenario 3. The following can be observed:

- The route between the two mainland ports of Bukakata and Kasensero is hardly used as the alternative road connection is more competitive, despite increased congestion in 2040. As such, it is omitted from the map.
- The route between Katosi and Damba Island is mainly used to avoid a transfer in Dembe (Lwaji Island) and is therefore moderately used.
- The modification of the route from Port Bell to Namisoke instead of Kalangala negatively impacts the service's volumes, as compared to the Port Bell – Kalangala route in scenario 2.

Figure 3.31 Passenger Demand - Scenario 3 - 2040 Results



The table below presents the 2040 modelling results for scenario 3 for each route, as well as the interpolation for the other target years. The following main is concluded:

- The integration of several services into routes with multiple stops increases the passenger volumes of the services, thus increasing the potential revenues. Additionally, less vessels need to be procured, resulting in lower CAPEX.
- The existing short range ferries remain the most competitive.
- As scenario 3 offers the most efficient routing and the largest spread of services across the lake, it is considered to be the optimal option in terms of connectivity. As such, scenario 3 is selected as the preferred scenario, and will be used for further analyses in this study.

Table 3-13 Passenger Demand - Scenario 3 Forecast Results

Route	Unit	2020	2025	2030	2035	2040
Bugaia - Lyabaana	Passengers per Day	214	249	289	332	379
Bukakata – Luku*	Passengers per Day	2,538	2,963	3,434	3,948	4,498
Buvuma – Kiyindi**	Passengers per Day	1,518	1,772	2,054	2,361	2,689
Buwanzi – Namoni – Masese	Passengers per Day	2,485	2,901	3,363	3,865	4,403
Buziri - Ssenyi	Passengers per Day	618	721	835	960	1,094
Bwondha – Matolo – Golofa	Passengers per Day	516	603	698	802	914
Damba Island – Katosi – Port Bell	Passengers per Day	752	878	1,017	1,170	1,332
Nakiwogo – Lutoboka***	Passengers per Day	200	233	271	311	354
Kyanvubu – Nakiwogo**	Passengers per Day	2,522	2,945	3,413	3,923	4,469
Ssenyi – Lwaji Island	Passengers per Day	129	151	175	201	229
Nakiwogo - Zingoola	Passengers per Day	152	178	206	237	270
Port Bell - Namisoke	Passengers per Day	130	152	176	203	231
Port Bell – Ggaba - Kigungu	Passengers per Day	1,141	1,332	1,544	1,775	2,021
Total	**Passengers per Day**	**9,893**	**11,548**	**13,384**	**15,385**	**17,527**

*Existing service operated by KIS; **Existing service operated by UNRA; ***Existing service operated by National Oil Distributors

4 Development Options & Cost Estimates

Summary

<u>Influence Area A – Point to Point Cargo Services</u>

For the envisioned point to point cargo services across the lake, the following transport options have been identified:

- Rehabilitation of the rail ferry facilities
- Lift on – Lift off (LoLo) barges
- LoLo, using dedicated LoLo cargo vessels
- Roll on – Roll off (RoRo) barges using MAFI trailers
- RoRo, using dedicated RoRo vessels

Based on a Multi Criteria Analysis (MCA), it is concluded that a RoRo ferry system is the preferred option for the point to point cargo services. Following the selection of a transport configuration, a specific vessel type needs to be selected. Given the size of the drydock facilities on Lake Victoria (situated in Kampala, Kisumu, and Mwanza), a length (LOA) of no more than 100m is preferred, to enable easy assembly and repair activities. Additionally, vessel draft should be limited to 3.0m, in order to limit required dredging works. The table below provides an overview of existing RoRo vessels that adhere to these requirements. It can be observed that the maximum capacity of vessels in the identified size class is approximately 1,400 DWT. However, it should be noted that, taking into account the weight of trucks on the RoRo ferries, the estimated average effective cargo capacity amounts to 1,200 tons per vessel.

The fleet size and estimated investment costs is presented in the following table.

Route	Quantity	Capex (USD)	Route	Quantity*	Capex (USD)
Port Bell to Mwanza	7	74,200,000	Jinja Pier to Mwanza	6	63,600,000
Port Bell to Kisumu	7	74,200,000	Jinja Pier to Kisumu	1	10,600,000

For the point to point cargo services, no landing site/port development is envisioned

<u>Influence Area B – Passenger Ferry Services</u>

Based on the variation in transport distances and forecast passenger volumes for each of the identified ferry routes, 3 design vessels have been identified. These design vessels are presented in the table below.

	Fast Ferry 1	Fast Ferry 2	Slow Ferry
			
Design Vessel	Dodekanisos Pride	Sikhululekile	MV Catriona*
Passenger Capacity	280	260	150
Vehicle Capacity	9	0	23
LOA (m)	40	32	44
Draft (m)	1.94	1.40	1.70
Max Speed (Knots)	32	30	10
Service Speed (Knots)	32	30	10

Lot	Route	Quantity	Capex (USD)	Lot	Route	Quantity	Capex (USD)
1.	Kyanvubu to Nakiwogo	1	8,500,000	3.	Bugaia to Lyabana	1	6,300,000
1.	Nakiwogo to Zingoola	1	9,400,000	4.	Ssenyi to Buziri	1	6,300,000
2.	Damba island to Port Bell and Katosi	1	6,300,000	4.	Ssenyi to Lwaji Island	1	6,300,000
2.	Port Bell to Namisoke	1	6,300,000	5.	Bwondha to Golofa and Matolo	1	6,300,000
3.	Buvuma to Kiyindi	1	8,500,000	6.	Port Bell to Kigungu and Ggaba	1	6,300,000
3.	Buwanzi to Masese and Namoni	1	6,300,000				

Subsequently, the required landing site development for the ferry passenger services are identified and detailed. Thereto, the following 5-step approach is applied:

1. The preferred landing sites are selected in section 4.2.1.1.
2. The selected landing sites are categorised based on their current development status in section 4.2.1.2.
3. The required developments for each landing site are outline in section 4.2.1.3.
4. High level port layouts are provided for the landing sites in section 4.2.1.4.
5. In section 4.2.1.5, cost estimates are provided for the envisioned developments.

The tables below provide a high-level overview of the development requirements for each of the landing sites and the base assumptions for landing site infrastructure components, respectively.

Landing Site	Required Developments
Nakiwogo	Paved waiting area for approx. 25 cars; redevelopment of current RoRo pier; redevelopment of ticketing office; development of toilets; redevelopment of awning for waiting passengers; introduction of safety measures
Kiyindi, Buvuma, and Kyanvubu	Paved waiting area for approx. 25 cars; redevelopment of current RoRo pier; development of ticketing office and toilets; development of awning for waiting passengers; introduction of safety measures
Zingoola, Masese, Buwanzi, Ggaba, Namoni, and Kigungu	Paved waiting area for approx. 10 cars; development of small RoRo pier; development of ticketing office and toilets; development of awning for waiting passengers; introduction of safety measures
All other landing sites (excluding Port Bell)	Development of small RoRo pier; development of ticketing office with toilets; development of awning for waiting passengers; introduction of safety measures
Port Bell	No works required, as works are already included in landlord port operations project ("Influence Area C")

Infrastructure / Superstructure*	
Ticketing Office	A ticketing office of 100 m2 has been assumed. The office includes the ticketing activities, toilets, and potentially a small shop or an office for police and/or customs officials.
Passenger Waiting Area	A basic passenger waiting area of 350 m2 has been assumed. This is sufficient to accommodate approximately 250 passengers, which is in line with the passenger capacity of the envisioned fast ferries. The passenger waiting area will also include benches and an awning, to provide comfort to waiting passengers. An example of an awning at a ferry terminal is presented in Figure 4.9.
Vehicle Waiting Area	For the calculation of the required vehicle waiting area, an area of 25 m2 per vehicle has been assumed. For each landing site, this area has been multiplied by the number of vehicles accommodated on the ferries that connect to the landing site, in order to arrive at the required vehicle waiting area.
Passenger Ferry Pier	A basic passenger ferry pier of 200 m2 (50 m long; 4 m wide) has been assumed.

RoPax Ferry Pier	A basic RoPax ferry pier of 240 m2 (26.5 m long; 9 m wide on average) has been assumed.
Dredging	In order to reach sufficient water depths (CD -2.0m for the passenger only fast ferry; CD -2.5 for the RoPax fast ferry), it is assumed that an access channel of approximately twice the width of the design vessel is dredged. It is noted that, as an alternative, longer piers could be constructed to reach sufficient water depths. This may be the preferred approach at sites that may need regular maintenance dredging. Due to a lack of adequate bathymetric data, dredging data is estimated based on the Navionics application (Navionics, 2017). Detailed bathymetric surveys will be required at a later stage.

*It is noted that precise infrastructure and superstructure specifications may vary between landing sites, based on specific characteristics and needs for the landing sites.

The table below provides a summarised overview of the CAPEX estimates for each of the landing sites, categorised by landing site class.

Class I Landing Site	Total CAPEX (USD)	Class II Landing Sites	Total CAPEX (USD)
Buwanzi	1,172,500	Buvuma Island	1,303,750
Buziri	681,000	Bwondha	627,500
Ggaba	1,461,250	Kiyindi	766,250
Gorofa	682,500	Kyanvubu	850,000
Kalyambuzi	737,500	Masese	994,375
Katosi	962,500	Nakiwogo	1,561,250
Kigungu	2,457,500	**Total – Class II Landing SItes**	**6,103,125**
Lubya	682,500		
Lwaji Island	699,000		
Lyabaana	682,500		
Matolo	712,500		
Namisoke	676,000		
Namoni	1,192,500		
Ssenyi	912,500		
Zingoola	1,181,875		
Total – Class I Landing SItes	**14,894,125**		

***Excludes class III landing sites, as the Port Bell and Jinja developments are covered in Influence Area C.**

Influence Area C – Port Bell and Jinja Port Operations under a Landlord Structure

Component	Port Bell Estimated amount (USD)	Jinja Pier Estimated amount (USD)
Rehabilitation of ferry berth	120,000	120,000
Buildings	887,000	887,000
Quay extension, filling	2,901,000	2,901,000
Mobilisation, demobilisation (15%)	586,000	586,000
Handling equipment, pallets inc. spares and training	662,000	662,000
Contingencies (20%)	1,031,000	1,031,000
Estimated investment costs	**6,187,000**	**6,187,000**

4.1 Service Routes & Fleet

This section is aimed at identifying the optimal service routes and respective fleets – comprising the required number of vessels and vessel types – for both the point to point cargo services across the lake and the passenger ferry services between the mainland and islands. Additionally, CAPEX and OPEX estimates are provided for the identified vessel types. Influence Area C, comprising the landlord operations of Port Bell and Jinja, is not covered in this assessment as no fleet is foreseen for this topic.

4.1.1 Point to Point Cargo Services Across the Lake ("Influence Area A")

Services

The focus for the (international) point to point cargo services across the lake is on the trade lanes between (i) Port Bell and Mwanza; (ii) Port Bell and Kisumu; (iii) Jinja and Mwanza; and (iv) Jinja and Kisumu. Besides these identified focus trade routes, the Due Diligence will assess the impact of other current ports (e.g., Bukoba) and proposed future developments (e.g., Bukasa and Lukaya) on the Lake Victoria transport system and on the demand and development requirements of Jinja and Port Bell in specific. However, no investment plans are to be prepared regarding these non-key trade ports.

Figure 4.1 Point to Point Cargo Services - Assessed Services

Figure 4.1 visualizes the point to point routes that will be assessed. Additionally, the table below provides an overview of the distances of these main trade lanes by lake transport.

From	To	Distance (Km)	Time (Hour)
Port Bell	Mwanza	344	16 - 19
Port Bell	Kisumu	319	13 - 14
Jinja	Mwanza	355	16 - 19
Jinja	Kisumu	277	11 - 12

Transport Options

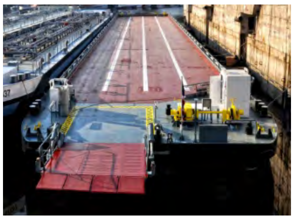
For the envisioned point to point cargo services across the lake, the following transport options have been identified:

- Rehabilitation of the rail ferry facilities: This involves rehabilitating the existing facilities to load rail wagons onto ferries. It does not involve significant new infrastructure projects. Alternatively, the wagon ferries can be used as RoRo vessels.
- Lift on – Lift off (LoLo) barges: This will necessitate the construction of an appropriately-sized quay with adequate draft to allow vessels to berth alongside while being loaded by means of a crane. The cargo is usually not loaded directly from the truck or rail wagon, but is first stored in a storage area until the arrival of the vessel. There are thus at least 4 movements by crane/reach stacker needed: 2 at the port of departure, 2 at the port of arrival.
- LoLo, using dedicated LoLo cargo vessels: similar to the LoLo barge system, this will necessitate the development of adequate quays and the acquisition of LoLo equipment at each of the ports. Additionally, dedicated box vessels will need to be constructed.
- Roll on – Roll off (RoRo) barges using MAFI trailers: This involves having a storage area in the port from where the cargo can be loaded onto a trailer by crane. This involves at least one movement: from the truck or rail wagon onto the trailer. Additionally, there will be a need for a substantial number of trailers that will travel between the ports on the lake.

Naturally, there will also be a need for adequate equipment (reach stackers) to handle the cargo. This option does give more flexibility, as both road and rail cargo can be loaded onto the vessels. A variant is the unaccompanied transport in which the truck leaves the trailer on board for pick up at the other side of the lake by an affiliate company.

- RoRo, using dedicated RoRo vessels: This involves allowing and facilitating trucks to drive onto the ferry, often referred to as accompanied roro transport. This option could be combined with the option for MAFI trailers (& unaccompanied transport). Regarding infrastructure, RoRo facilities (a roro ramp and truck alignment spaces) need to be in place. The existing rail link spans can also be used to accommodate RoRo vessels when the roro ramp is small enough (not more than 6m wide) which is commonly not the case. An advantage of the RoRo vessels comprises their ability to carry personal vehicles and passengers, besides transporting cargo.

Table 4-1 Point to Point Cargo Services - Transport Options

Transport System	Description	Vessel Types
Rail Ferry	The transport system that was originally introduced during the EARHC period. The system entails using rail ferries that carry rail wagons across the lake, as an extension of the railway networks in Uganda, Tanzania, and Kenya.	
LoLo Barge	Tugs towing or pushing container barges are commonplace on the principal rivers and lakes of North America, Europe, and Asia. However, this system requires that each port on the vessel's itinerary is equipped with LoLo capability. As almost no LoLo equipment is currently available in the Lake Victoria ports, implementation of such a system would currently entail excessive investments.	
LoLo Cargo Vessel	Similar to the LoLo barge system, the LoLo cargo vessel concept employs cranes to lift (containerized) cargo on and off the vessel. When (containerized) cargo streams grow sufficiently, a LoLo system provides a highly efficient and high capacity way of cargo transport.	
RoRo Barge	An alternative to the LoLo barge concept is the RoRo barge system. For the Lake Victoria case, barges of approximately 100m in length could likely be deployed (due to the dimensions of available drydocks). The barge can be moored vertically to the quay with either a pull out, drop down ramp attached to the vessel or a portable ramp supplied by the port to be used to connect it with the yard. Tractors from the port would then be used to roll the containers on chassis on and off the vessels. The barges are pulled/pushed by tug boats during transport on open water; during berthing operations, the tugs will attach alongside the barge to manoeuvre it into or from the quay. For the RoRo barge system, barges of varying sizes can be employed. Additionally, self-propelled barges can be deployed instead of barge and tug combinations.	 
RoRo Ferry	RoRo vessels can accommodate both unaccompanied and accompanied RoRo transport. In order to load/offload cargo, the RoRo vessels are equipped with either an aft ramp (first picture on the right) or a front ramp (second picture on the right). Alternatively, some RoRo vessels have a ramp on both ends of the vessel, in order to facilitate loading and offloading by enabling vehicles to enter and exit the vessel in the same direction.	 

Subsequently, for the purpose of selecting a preferred transport option, a Multi Criteria Analysis (MCA) is employed, as MCAs are commonly employed to evaluate a set of alternatives with the purpose of identifying a preferred option. The MCA methodology is detailed below.

Identification of Assessment Criteria

The first step in the MCA methodology consists of identifying the criteria on which the assessment will be based. The table below provides an overview of the criteria used in the MCA.

Table 4-2 Transport Options MCA – Assessment Factors

Criteria	Description
Operational Efficiency (Weight: 0.25)	A qualitative assessment of the operational capacity and typical loading/discharging rates of the identified transport options. Additionally, this assessment considers the operational costs of the transport options.
Versatility (Weight: 0.15)	A qualitative assessment of the types of cargoes that can be transported with each of the transport options, and the ways in which the transport options can be operated.
Required Investments (Weight: 0.20)	A qualitative assessment of the required investments in infrastructure, superstructure, equipment, and vessels required to implement each of the transport options.
Ease of Implementation (Weight: 0.20)	A qualitative assessment of the ease of implementing each of the transport options, given potential synergies with the current lake transport system configuration.
Sustainability (Weight: 0.20)	A qualitative assessment of how 'future proof' the transport options are. This assessment looks, inter alia, at the feasibility of the transport options once volumes on the lake increase.

MCA Weighting

Each criterion has been assigned a weight, indicating the importance of a specific criterion in relation to the other criteria. The scoring weights for the criteria have been included in Table 4-2 between brackets.

MCA Scoring

The expected performance of each of the investigated options is scored against the identified criteria. Options with better performance on a criterion are assigned a higher numerical score, based on the estimated magnitude of the performance difference between options. For the purposes of evaluating the transport options and vessel types, a scale ranging between 1 and 5 was used, where 1 represents the worst possible performance and 5 represents the best possible performance on a criterion or sub-criterion.

However, the sum of scores for each criterion amounts to 10, to avoid assigning more weight to some sub-criteria than to others, as weighting has already been formally done in the weighting step. E.g.: if 2 out of 3 options show similar performance, and a 3rd option showcases a performance that is deemed half as favourable, the former two options would receive a score of 4, whereas the latter option would receive a score of 2 (sum equals 10 points).

Computation & Evaluation

The score and weight components are subsequently combined in order to provide an overall assessment of each of the options considered. The final score for each option is evaluated by applying the following formula:

$$Final\ Score_i = \sum_{j=1}^{n} w_j * s_j^i$$

Table 4-3 MCA - Score Computation Legend

Item	Description
$Final\ Score_i$	Final weighted score for option *i*
w_j	Weight for criterion *j*
s_j^i	The score for option *i* (score between 1 and 5), when assessed on criterion *j*

The tables below provide an overview of the (unweighted) transport options' performance on each of the identified criteria, including a justification of the assigned scores. In Table 4-9, the total weighted scores of the options are presented.

Table 4-4 Point to Point Cargo Services - Operational Efficiency

Transport Option	Operational Efficiency	Score
Rail Ferry	Capacity is quite low, as the rail ferries are equipped to carry 19 rail wagons (equivalent of 38 TEU). Additionally, the loading and discharging rate is relatively low, and the operational costs of the outdated rail ferries are high.	1.0
LoLo Barge	The LoLo barge system is highly efficient, due to the substantial capacity and high loading/discharging rates (rate depends on the amount of LoLo equipment is available in a port). Additionally, while a barge is being loaded/discharged, the tugs that were used to push/pull the barge can be used to transport another barge.	3.5
LoLo Cargo Vessel	Similar to the LoLo barge, the LoLo cargo vessels typically have a substantial capacity and high loading/discharging rates. In contrast to the LoLo barge system, the vessel cannot undertake other transport activities while being loaded/discharged.	2.5
RoRo Barge	The RoRo barge system comprises containers on chassis that are loaded on/discharged from the barges by terminal tractors. As the containers are placed on chassis, they occupy more space (compared to the LoLo barge concept) and cannot be stacked. As such, the RoRo barge system has a lower operational capacity than a similar LoLo barge. Additionally, the terminal tractor system is typically less efficient than the LoLo system concerning loading/discharging operations.	1.5
RoRo Ferry	Similar to the RoRo barge system, the RoRo ferry system typically has a lower capacity than its LoLo counterpart, as containers are placed on chassis. Capacity is further lowered if the trailers/chassis are accompanied by trucks. Loading/discharging of accompanied trailers is typically faster than loading/discharging of unaccompanied chassis (as is the case with the RoRo barge option), making the RoRo ferry option slightly more efficient than the RoRo barge system. It should be noted that a RoRo ferry with accompanied cargo (laden trucks) has a lower effective cargo load than a RoRo ferry with unaccompanied cargo, as the weight of the trucks needs to be considered.	1.5

Table 4-5 Point to Point Cargo Services - Versatility

Transport Option	Versatility	Score
Rail Ferry	Besides accommodating rail wagons, the rail ferries can accommodate passengers or trucks/trailers (with some minor adjustments to the vessels or ports, such as the placement of a ramp). As such, the rail ferry has some versatility.	2.5
LoLo Barge	The LoLo barge system is not suited to be deployed in different ways.	1.0
LoLo Cargo Vessel	A LoLo cargo vessel could potentially carry passengers, with some minor adjustments to the vessel to accommodate safe and smooth boarding.	2.0
RoRo Barge	The RoRo barge system is not suited to be deployed in different ways.	1.0
RoRo Ferry	The RoRo ferry is relatively versatile, as it can accommodate both accompanied (i.e., trucks with trailers) and unaccompanied (i.e., trailers without trucks) transport, as well as passengers.	3.5

Table 4-6 Point to Point Cargo Services - Required Investments

Transport Option	Required Investments	Score
Rail Ferry	Low - rehabilitation of current vessels and link spans	3.0
LoLo Barge	High - cranes and adequate berths required at each of the ports; barges & tugs required	1.0
LoLo Cargo Vessel	High - cranes and adequate berths required at each of the ports; LoLo vessels required	1.0
RoRo Barge	Medium - barges, tugs, chassis, and terminal tractors required, and minor adjustments to infrastructure may be required	2.5
RoRo Ferry	Medium - new RoRo vessels and adjustment of link spans / development of RoRo facilities	2.5

Table 4-7 Point to Point Cargo Services - Ease of Implementation

Transport Option	Ease of Implementation	Score
Rail Ferry	The majority of required infrastructure and equipment is already available. However, the full potential of the rail ferry system can only be unlocked if the rail connections to the ports are restored; as the rail connections to most of the ports around the lake are dilapidated/inaccessible, this may require substantial cooperative efforts from Uganda, Tanzania, and Kenya to restore the rail networks.	1.5
LoLo Barge	The implementation of a LoLo barge system would require the procurement of tugs and barges. Additionally, harmonized development of ports around the lake would be required, as each port would require cranes, reach stackers, and adequate (paved) areas to store the containers.	1.5
LoLo Cargo Vessel	Similar to the LoLo barge system, each of the ports would need to be equipped with adequate equipment and storage areas to implement this system. Additionally, cargo vessels would need to be procured, although several vessels on the lake could already be deployed as LoLo vessels.	1.5
RoRo Barge	For the RoRo barge system, only slight adjustments to current infrastructure are required. Adjustments include rehabilitation/adaptation of the rail ferry linkspans. Additionally, tugs, barges, and chassis have to be procured.	2.5
RoRo Ferry	Similar to the RoRo barge system, only slight adjustments to the infrastructure are required.	3.0

Table 4-8 Point to Point Cargo Services - Sustainability

Transport Option	Sustainability	Score
Rail Ferry	The limited capacity and high operating costs make the rail ferries unsuitable for long-term operations	1.0
LoLo Barge	The high efficiency of the LoLo barge system results in short berthing times, enabling more capacity to be added before additional berthing facilities are required (compared to other transport options). Additionally, the efficiency results in low costs per unit of cargo, making lake transport more competitive. As such, the LoLo barge system is very suitable for long-term operations	2.5
LoLo Cargo Vessel	Similar to the LoLo barge system, the LoLo cargo vessel system is quite well suited for long-term operations. Its operational capacity and efficiency are lower than the LoLo barge system; however, the LoLo cargo vessel makes up for this with higher versatility.	2.5
RoRo Barge	Due to limited versatility and lower operational capacity, as compared to the LoLo options and RoRo ferry, the RoRo barge system lacks significant long-term sustainability.	1.5
RoRo Ferry	Despite having less capacity than the LoLo barge system, the RoRo ferry system is considered well suited for long-term operations, as its versatility entails that it can be employed irrespective of the development path of the lake transport system. However, compared to the rail ferry and LoLo options, the RoRo ferry system will not be able to benefit as much from potential future rail connections.	2.5

The table below summarizes the weighted scores, using the weights determined in Table 4-2. It is concluded that a RoRo ferry system if the preferred option for the point to point cargo services.

Table 4-9 Point to Point Cargo Services – MCA Scoring

Criteria	Rail Ferry	LoLo Barge	LoLo Vessel	RoRo Barge	RoRo Ferry	*Total*
Operational Efficiency (0.25)	0.25	0.88	0.63	0.38	0.38	*2.50*
Versatility (0.15)	0.38	0.15	0.30	0.15	0.53	*1.50*
Required Investments (0.20)	0.60	0.20	0.20	0.50	0.50	*2.00*
Ease of Implementation (0.20)	0.30	0.30	0.30	0.50	0.60	*2.00*
Sustainability (0.20)	0.20	0.50	0.50	0.30	0.50	*2.00*
Total	**1.73**	**2.03**	**1.93**	**1.83**	**2.50**	***10.00***

Vessel Type

Following the selection of a transport configuration, a specific vessel type needs to be selected. Given the size of the drydock facilities on Lake Victoria (situated in Kampala, Kisumu, and Mwanza), a length (LOA) of no more than 100m is preferred, to enable easy assembly and repair activities. Additionally, vessel draft should be limited to 3.0m, in order to limit required dredging works. The table below provides an overview of existing RoRo vessels that adhere to these requirements. It can be observed that the maximum capacity of vessels in the identified size class is approximately 1,400 DWT. However, it should be noted that, taking into account the weight of trucks on the RoRo ferries, the estimated average effective cargo capacity amounts to 1,200 tons per vessel.

Table 4-10 RoRo Ferry Vessel Overview

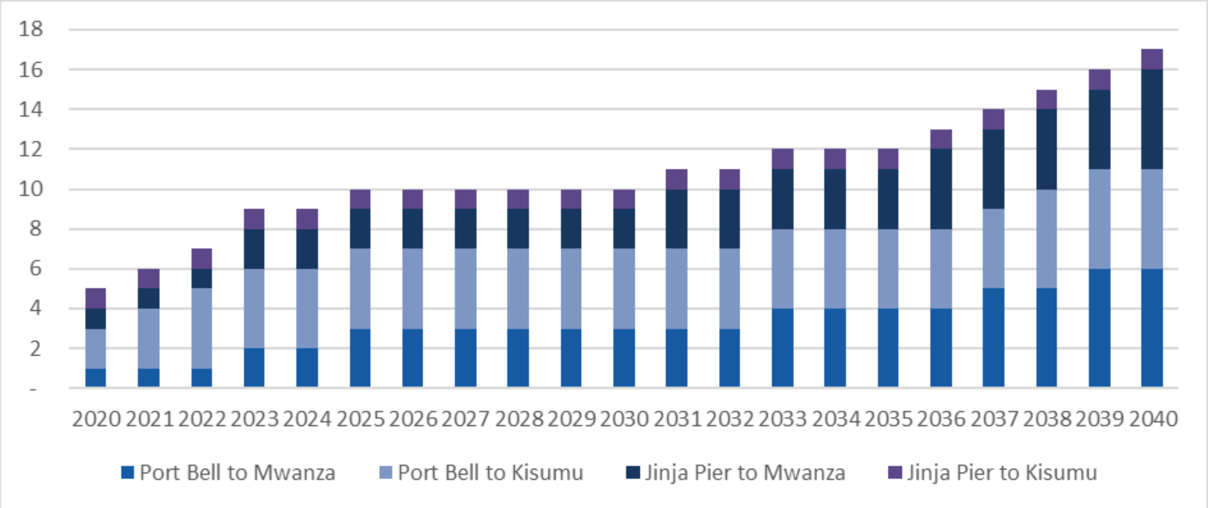
Name	Type	GT	Dwt	LOA (m)	Draught (m)	Beam (m)	Speed (knots)
Goodwill Star	Ro-Ro	2,475	1,073	80.38	2.10	19.20	N/A
Bol	Ro-Ro Freight/Passenger	2,330	1,000	95.40	2.30	20.00	12.00
Faneromeni	Ro-Ro Freight/Passenger	498	590	73.00	2.30	15.00	5.20
Barbat	Ro-Ro Freight/Passenger	837	650	73.00	2.40	15.02	N/A
Stira Diamond	Ro-Ro Freight/Passenger	803	628	75.00	2.40	16.00	12.00
Ioannis Sophia K	Ro-Ro Freight/Passenger	1,800	745	100.00	2.50	18.00	N/A
Bruce	Ro-Ro Freight/Passenger	1,177	687	83.13	2.50	16.00	12.00
FB Eleni	Ro-Ro Freight/Passenger	877	678	77.75	2.59	15.75	12.00
Breuil	Ro-Ro	1,285	620	75.00	2.60	13.80	11.00
Protoporos IV	Ro-Ro Freight/Passenger	1,814	810	97.85	2.66	16.00	N/A
Thassos III	Ro-Ro Freight/Passenger	995	900	100.00	2.70	18.10	N/A
Pobeda	Ro-Ro Freight/Passenger	1,997	679	99.65	2.75	16.50	14.00
Azam Sealink 1	Ro-Ro Freight/Passenger	997	679	99.65	2.75	16.50	14.00
Navarchos Apostolis II	Ro-Ro Freight/Passenger	983	1,000	93.20	2.76	17.56	14.50
Don Baldo	Ro-Ro Freight/Passenger	2,257	682	80.30	2.80	12.10	15.00
La Caranta	Ro-Ro Freight/Passenger	1,552	1,400	83.80	2.80	17.40	15.00
La Restinga	Ro-Ro Freight/Passenger	1,550	1,400	83.80	2.80	17.40	15.00
Ilovik	Ro-Ro Freight/Passenger	1,335	1,030	95.80	2.80	17.56	12.00
Rola do Mar	Ro-Ro Freight/Passenger	949	525	71.20	2.80	13.70	N/A
Pato Real	Ro-Ro Freight/Passenger	949	525	70.00	2.80	13.70	N/A
Aiolos	Ro-Ro Freight/Passenger	878	780	87.80	2.80	16.00	13.00
Dorival Caymmi	Ro-Ro Freight/Passenger	855	550	86.00	2.80	17.00	7.00
Aris III	Ro-Ro Freight/Passenger	496	680	83.00	2.80	15.70	13.50
Isleno II	Ro-Ro	499	1,144	77.01	2.87	13.10	12.50
Trailer Princess	Ro-Ro	2,689	1,422	93.79	3.00	17.22	10.00

Source: Clarksons Vessel Database, 2017

Fleet Size

The number of RoRo Ferries is to be expanded over time, as demand increases. This is presented in the following figure.

Figure 4.2 Point to Point Cargo Services - Fleet Size



Cost Estimates

<u>CAPEX</u>

The capex for the freight vessel operations is limited to the investment in vessels, as infrastructure and superstructure belongs to the operation of the respective inland ports (see section 4.2.2). The capex for the freight vessels is dependent on the fleet size on the four routes between Port Bell, Jinja Pier, Kisumu and Mwanza and is presented in the following table.

Table 4-11 Capex assumptions for the purchase of vessels

Route	Quantity*	Capex (USD)
Freight vessels		
Port Bell to Mwanza	7	74,200,000
Port Bell to Kisumu	7	74,200,000
Jinja Pier to Mwanza	6	63,600,000
Jinja Pier to Kisumu	1	10,600,000

*Quantity with respect to end-state in 2040, operation starts with one vessel per route, expanding corresponding with the growth in demand.

<u>OPEX</u>

Operating expenditures for the freight vessels are separated in the categories vessels and management. OPEX of the landside operations is included in the operation of the respective inland ports (see section 4.2.2):

- Vessels
  - Fuel & lubricants
  - Labour
  - Maintenance & insurance
  - Overhead costs
- Overhead management

Table 4-12 Opex assumptions for vessels

	RoRo Ferry
Fuel & lubricants	
Fuel consumption - sailing	158 ltr/hr
Fuel consumption - idle	19 ltr/hr
Diesel price USD/ltr	0.84 USD/ltr
Lubricants consumption - sailing	5.5 ltr/hr
Lubricants consumption - idle	0.7 ltr/hr
Lubricants price USD/ltr	4.61 ltr/hr
Labour costs / gang / year	1 Captain @ 18,200 USD/year
	1 Chief mate @ 10,200 USD/year
	1 Chief engineer @ 5,800 USD/year
	1 Officer of watch @ 8,700 USD/year
	6 Stewards @ 3,600 USD/year / per person
Maintenance and insurance	
Maintenance	2.0% of vessel purchase price
Insurance	2.0% of vessel purchase price

The operating expenditures for the management of the freight vessels on all four routes is presented in the following table.

Table 4-13 Opex assumptions for overhead management

Component	Opex (USD)
Labour	
Overhead management	3 senior managers @ 50,000 USD / year / person
	1 operations manager @ 20,000 USD/year
	1 clerk @ 15,000 USD / year
Office space (rental)	12,000 USD /year

4.1.2 Lake Victoria Passenger Ferry Services ("Influence Area B")

Services

The following preferred passenger ferry services have been identified through the demand forecast in section 3:

- Kyanvubu – Nakiwogo
- Nakiwogo – Zingoola
- Port Bell – Damba Island – Katosi
- Port Bell – Namisoke
- Port Bell – Ggaba – Kigungu
- Masese – Buwanzi – Namoni
- Buvuma – Kiyindi
- Ssenyi – Buziri
- Ssenyi – Lwaji Island
- Bugaia – Lyabana
- Bwondha – Golofa – Matolo

Vessel Type

As the proposed ferry services vary in distance and comprise landing destinations/origins that vary in size and development level, the following three ferry types have been identified to cater to the specific needs of the individual services:

- Fast Ferry 1 – catamaran with capacity for vehicles
- Fast ferry 2 – catamaran without capacity for vehicles
- Slow ferry – monohull with capacity for vehicles

The table below provides more detailed data regarding the design vessels.

Table 4-14 Passenger Ferry - Design Vessels

	Fast Ferry 1	Fast Ferry 2	Slow Ferry
			
Design Vessel	Dodekanisos Pride	Sikhululekile	MV Catriona*
Passenger Capacity	280	260	150
Vehicle Capacity	9	0	23
LOA (m)	40	32	44
Draft (m)	1.94	1.40	1.70
Max Speed (Knots)	32	30	10
Service Speed (Knots)	32	30	10

*MV Catriona is a diesel electric hybrid vessel, with an operating speed of 9 knots. For the Lake Victoria services, a similar vessel with a traditional power source is envisioned to decrease investments costs.

Subsequently, a preferred vessel type is selected for each of the ferry service routes, based on the following three factors:

- Travel time – if the one-way travel time, at an assumed average slow ferry speed of 14 knots, exceeds 1.5 hours, one of the two fast ferry options is preferred.
- Passenger capacity – if the one-way travel time, at an assumed average slow ferry speed of 14 knots, does not exceed 1.5 hours, the slow ferry is preferred. However, if the one-way passenger volume exceeds 150 passengers (the assumed passenger capacity for a slow ferry) in the 2040 demand forecast, the fast ferry with vehicle capacity is selected, despite the limited travel time.

- Vehicle capacity requirement – Vehicle capacity on the ferry is preferred when (i) islands connected through the ferry service are considered adequately large to benefit from vehicle transport (e.g., pickup trucks that carry goods to/from the island) and (ii) landing sites along the ferry route have adequate road connections.

This vessel type selection process is visualised in the decision tree below. Subsequently, the resulting vessel type selection is presented in Table 4-15.

Figure 4.3 Passenger Ferry - Vessel Type Selection Methodology

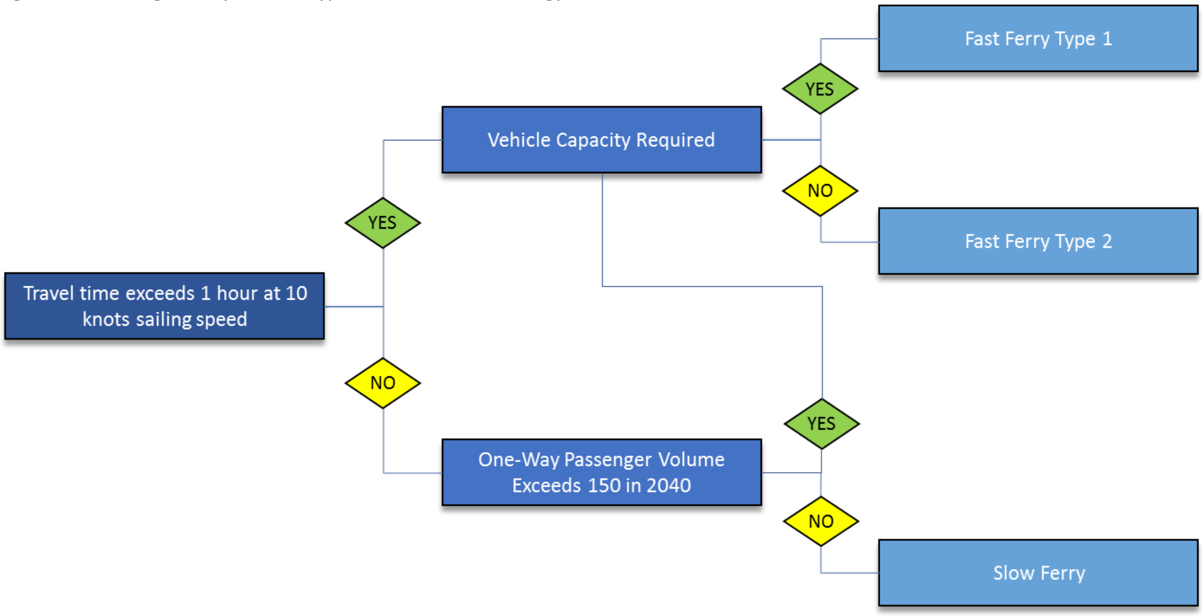


Table 4-15 Passenger Ferry - Vessel Type Selection

Service	Distance (nm)*	Travel Time (Hours @ 10 knots)**	2040 One-way Passenger Volume	Vehicle Capacity***	Vessel Type
Kyanvubu – Nakiwogo*****	0.8	0.08	2,235	Yes	Slow Ferry*****
Nakiwogo – Zingoola	26.1	2.61	135	Yes	Fast Ferry 1
Damba Island – Katosi – Port Bell	33.1	3.31	666	No	Fast Ferry 2
Port Bell – Namisoke	37.0	3.70	116	No	Fast Ferry 2
Port Bell – Ggaba – Kigungu****	26.7	2.67	1,011	Yes	Fast Ferry****
Kiyindi – Buvuma*****	4.0	0.40	1,345	Yes	Slow Ferry*****
Namoni – Buwanzi – Masese	15.7	1.57	2,202	Yes	Fast Ferry 1
Ssenyi – Buziri	12.4	1.24	547	No	Fast Ferry 2
Ssenyi – Lwaji Island	13.1	1.31	115	No	Fast Ferry 2
Bugaia – Lyabaana	3.0	0.30	190	No	Fast Ferry 2
Golofa – Matolo – Bwondha	41.9	4.19	457	No	Fast Ferry 2

**One-way distance*
***One-way travel time*
****For the assessment of vehicle capacity requirement, the additional costs of such capacity and the current vehicle capacity to destinations is considered*
*****The airport express (Port Bell – Ggaba – Kigungu) requires a high service frequency to become competitive vis-à-vis road. As such, a smaller high frequency fast ferry with a capacity of 50 passengers is envisioned for this service.*
******Despite the fact that the forecast one-way passenger volumes exceed the slow ferry capacity, the slow ferry is preferred as it has a larger vehicle capacity; the Kyanvubu – Nakiwogo and Kiyindi – Buvuma routes are mainly aimed at accommodating vehicular traffic. Additionally, these current UNRA crossings are short-distance services, enabling a ferry with a smaller capacity to accommodate substantial passenger volumes through frequent crossings.*

Cost Estimates

CAPEX

For the implementation of the passenger ferries, two main categories of capital investment are required:

- Purchase of vessels
- Rehabilitation and construction of Landing Sites

The table below presents the estimated CAPEX related to vessel procurement; landing site development costs are covered in section 4.2.1.5.

Table 4-16 Capex assumptions for the purchase of vessels

Lot	Route	Quantity	Capex (USD)
1.	Kyanvubu to Nakiwogo	1	8,500,000
1.	Nakiwogo to Zingoola	1	9,400,000
2.	Damba island to Port Bell and Katosi	1	6,300,000
2.	Port Bell to Namisoke	1	6,300,000
3.	Buvuma to Kiyindi	1	8,500,000
3.	Buwanzi to Masese and Namoni	1	6,300,000
3.	Bugaia to Lyabana	1	6,300,000
4.	Ssenyi to Buziri	1	6,300,000
4.	Ssenyi to Lwaji Island	1	6,300,000
5.	Bwondha to Golofa and Matolo	1	6,300,000
6.	Port Bell to Kigungu and Ggaba	1	6,300,000

OPEX

Operating expenditures for the passenger ferries are separated in categories vessel, landing sites, management as follows:

- Vessels – Fuel & lubricants; labour; maintenance & insurance; and overhead
- Landing sites - Labour
- Management – Labour and office space (rental)

The table below presents the estimated operating costs related to the vessels; the landing site labour and ferry service management components are covered in section 4.2.1.5.

Table 4-17 Opex assumptions for vessels

	Damen 3209	Dodekanisos	MV Catriona
Fuel & lubricants			
Fuel consumption - sailing	800 ltr/hr	800 ltr/hr	736 ltr/hr
Fuel consumption - idle	50 ltr/hr	96 ltr/hr	88 ltr/hr
Diesel price USD/ltr	0.84 USD/ltr	0.84 USD/ltr	0.84 USD/ltr
Lubricants consumption - sailing	6.5 ltr/hr	6.5 ltr/hr	5.8 ltr/hr
Lubricants consumption - idle	0.7 ltr/hr	0.7 ltr/hr	0.5 ltr/hr
Lubricants price USD/ltr	4.61 ltr/hr	4.61 ltr/hr	4.61 ltr/hr

	Damen 3209	Dodekanisos	MV Catriona
Labour			
Labour costs / gang / year	1 Captain @ 18,200 USD/year	1 Captain @ 18,200 USD/year	1 Captain @ 18,200 USD/year
	1 Chief mate @ 10,200 USD/year	1 Chief mate @ 10,200 USD/year	1 Chief mate @ 10,200 USD/year
	1 Chief engineer @ 5,800 USD/year	1 Chief engineer @ 5,800 USD/year	1 Chief engineer @ 5,800 USD/year
	1 Officer of watch @ 8,700 USD/year	1 Officer of watch @ 8,700 USD/year	1 Officer of watch @ 8,700 USD/year
	2 Stewards @ 3,600 USD/year / per person	2 Stewards @ 3,600 USD/year / per person	2 Stewards @ 3,600 USD/year / per person
Maintenance and insurance			
Maintenance	2.0% of vessel purchase price	2.0% of vessel purchase price	2.0% of vessel purchase price
Insurance	2.0% of vessel purchase price	2.0% of vessel purchase price	2.0% of vessel purchase price

4.2 Landing Site Development

This section is aimed at identifying the required landing site developments to support the envisioned activities for Influence Areas B and C; Influence Area A, comprising the point to point cargo services across the lake, is excluded from the assessment, as this topic solely focuses on vessel operations between existing ports. The landing site development assessment covers technical specifications of the envisioned landing site developments, as well as high level CAPEX and OPEX estimates.

4.2.1 Lake Victoria Passenger Ferry Services ("Influence Area B")

In this section, the required landing site development for the ferry passenger services are identified and detailed. Thereto, the following 5-step approach is applied:

1. The preferred landing sites are selected in section 4.2.1.1.
2. The selected landing sites are categorised based on their current development status in section 4.2.1.2.
3. The required developments for each landing site are outline in section 4.2.1.3.
4. High level port layouts are provided for the landing sites in section 4.2.1.4.
5. In section 4.2.1.5, cost estimates are provided for the envisioned developments.

4.2.1.1 Landing Site Selection

For the passenger ferry services, the following preferred landing sites have been identified in the demand forecast (section 3):

West Area	East Area
• Kyanvubu	• Masese
• Nakiwogo	• Buwanzi
• Zingoola	• Namoni
• Port Bell	• Buvuma
• Damba Island	• Kiyindi
• Katosi	• Ssenyi
• Namisoke	• Buziri
• Ggaba	• Lwaji Island
• Kigungu	• Bugaia
	• Lyabana
	• Bwondha
	• Golofa
	• Matolo

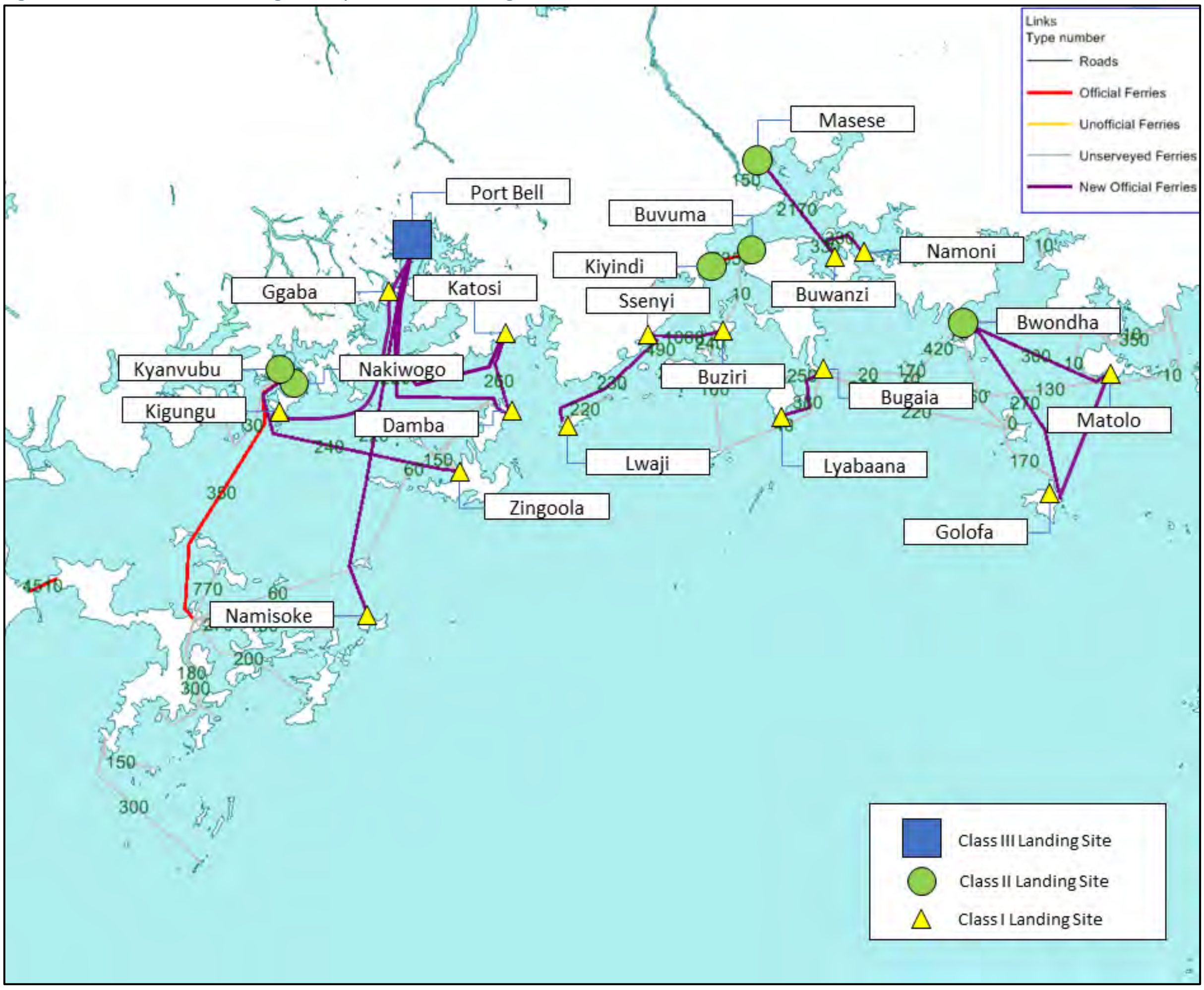
4.2.1.2 Landing Site Development Status

In order to determine the development requirements for each of the selected landing sites, all selected landing sites are categorised as class III (developed ports), class II (developed areas with a pier available), or class I (cultivated beach areas) landing sites. The table below presents the classification of the landing sites; subsequently, Figure 4.4 maps the classified landing sites.

Table 4-18 Lake Victoria Passenger Ferry Services - Landing Site Classification

Landing Site Class	Landing Sites Included
Class I	Namisoke, Damba, Katosi, Zingoola, Lwaji, Ssenyi, Buwanzi, Namoni, Bugaia, Lyabaana, Golofa, Matolo, Buziri, Ggaba, Kigungu
Class II	Kyanvubu, Nakiwogo, Kiyindi, Buvuma, Masese, Bwondha
Class III	Port Bell

Figure 4.4 Lake Victoria Passenger Ferry Services - Landing Site Overview



4.2.1.3 Development Requirements

Given the current status and the selected ferry types for each of the landing sites, the table below provides an overview of required developments at each of the landing sites.

Table 4-19 Ferry Landing Site Development Requirements

Landing Site	Required Developments
Nakiwogo	Paved waiting area for approx. 25 cars; redevelopment of current RoRo pier; redevelopment of ticketing office; development of toilets; redevelopment of awning for waiting passengers; introduction of safety measures
Kiyindi, Buvuma, and Kyanvubu	Paved waiting area for approx. 25 cars; redevelopment of current RoRo pier; development of ticketing office and toilets; development of awning for waiting passengers; introduction of safety measures
Zingoola, Masese, Buwanzi, Ggaba, Namoni, and Kigungu	Paved waiting area for approx. 10 cars; development of small RoRo pier; development of ticketing office and toilets; development of awning for waiting passengers; introduction of safety measures
All other landing sites (excluding Port Bell)	Development of small RoRo pier; development of ticketing office with toilets; development of awning for waiting passengers; introduction of safety measures
Port Bell	No works required, as works are already included in landlord port operations project ("Influence Area C")

Subsequently, examples are provided for the envisioned passenger only and passenger and vehicle (RoPax) ferry pier structures.

Passenger Ferry Pier Development

For the passenger only ferry services, a 4m wide walkway is typically used. The ferry can moor alongside the walkway to allow for swift and safe boarding activities. Ideally, the ferry can simultaneously moor alongside the pier and connect to the dock with its rear, to further enhance the potential boarding speed. The figure below provides an example from Marseille (France).

Figure 4.5 Marseille Passenger Ferry Pier

If the distance to sufficiently deep waters is excessive, constructing a dock into the water to reach deep waters is typically not cost-efficient. In such a case, there are generally two options to reduce the costs of the development:

1. The area may be dredged to enable the construction of a shorter pier.
2. The pier can be placed in deeper waters; a gangway can then be used to bridge the gap between the dock and the mainland, as shown in the figure below.

Figure 4.6 Gangway Connection

In order to mitigate risks resulting from a potential increase or decrease of the water levels on Lake Victoria, a floating dock structure may be placed instead of a fixed structure.

RoPax Ferry Pier Development

For the RoPax services, a wider and sturdier pier structure is required, as the pier needs to support car and truck traffic. However, the types of structures that can be deployed are similar to the passenger ferry pier. Figure 4.7 shows a gangway connection to a floating dock, similar to the passenger pier construction. It is noted that, in contrast to the passenger only ferries, the RoPax ferries are typically boarded only through an aft or front ramp. As such, the ferry will not be moored alongside the dock and will thus need to be secured to mooring dolphins. The mooring dolphins can be observed behind the mooring platform in the figure below; a walkway typically connects the mooring dolphins to enable easy access to the mooring dolphins from the vessel and from the platform.

Figure 4.7 Floating Pier with Gangway

The figure below shows the connection of the RoPax ferry to the pier, through its front ramp. Whereas the vehicles in the figure below are parked on a wide parking area, vehicles waiting for a ferry typically line up in an amount of lanes equal to the amount of driving lanes available on the vessel.

Figure 4.8 RoPax Ferry Pier

4.2.1.4 Port Layouts

Based on the identified development requirements, indicatory landing site layouts are presented for each of the landing sites in section 4.2.1.4. The layouts detail (i) the identified development requirements; (ii) access roads if so required for vehicle access; and (iii) dredging requirements.

The table below provides an overview of the assumptions concerning the technical specifications of each of the infrastructure and superstructure developments. It is noted that the technical specifications applied for landing sites may deviate from the base assumptions, based on specific characteristics of the landing sites. Where relevant, such deviations are noted under the individual landing site layouts.

Infrastructure / Superstructure	
Ticketing Office	A ticketing office of 100 m2 has been assumed. The office includes the ticketing activities, toilets, and potentially a small shop or an office for police and/or customs officials.
Passenger Waiting Area	A basic passenger waiting area of 350 m2 has been assumed. This is sufficient to accommodate approximately 250 passengers, which is in line with the passenger capacity of the envisioned fast ferries. The passenger waiting area will also include benches and an awning, to provide comfort to waiting passengers. An example of an awning at a ferry terminal is presented in Figure 4.9.
Vehicle Waiting Area	For the calculation of the required vehicle waiting area, an area of 25 m2 per vehicle has been assumed. For each landing site, this area has been multiplied by the number of vehicles accommodated on the ferries that connect to the landing site, in order to arrive at the required vehicle waiting area.
Passenger Ferry Pier	A basic passenger ferry pier of 200 m2 (50 m long; 4 m wide) has been assumed.
RoPax Ferry Pier	A basic RoPax ferry pier of 240 m2 (26.5 m long; 9 m wide on average) has been assumed.
Dredging	In order to reach sufficient water depths (CD -2.0m for the passenger only fast ferry; CD -2.5 for the RoPax fast ferry), it is assumed that an access channel of approximately twice the width of the design vessel is dredged. It is noted that, as an alternative, longer piers could be constructed to reach sufficient water depths. This may be the preferred approach at sites that may need regular maintenance dredging. Due to a lack of adequate bathymetric data, dredging data is estimated based on the Navionics application (Navionics, 2017). Detailed bathymetric surveys will be required at a later srtage.

Figure 4.9 Passenger Terminal with Awning

Subsequently, the high-level landing site layouts are presented individually in the sections below, in alphabetical order.

Buvumu Island Landing Site, Buvuma

Development	Current Land Use	Size	Land Ownership
Ticketing Office (red)*	On land with some existing structures	100 m2	n/a
Vehicle Parking (green)	On land with some existing structures	625 m2**	Unknown
Passenger Waiting Area (yellow)	On land with some existing structures	350 m2	Unknown
RoRo Pier (grey/light blue)	Existing simple pier structure	240 m2	Unknown
Access road***	n/a	n/a	n/a

* The ticketing office is only required if the service becomes a paid service

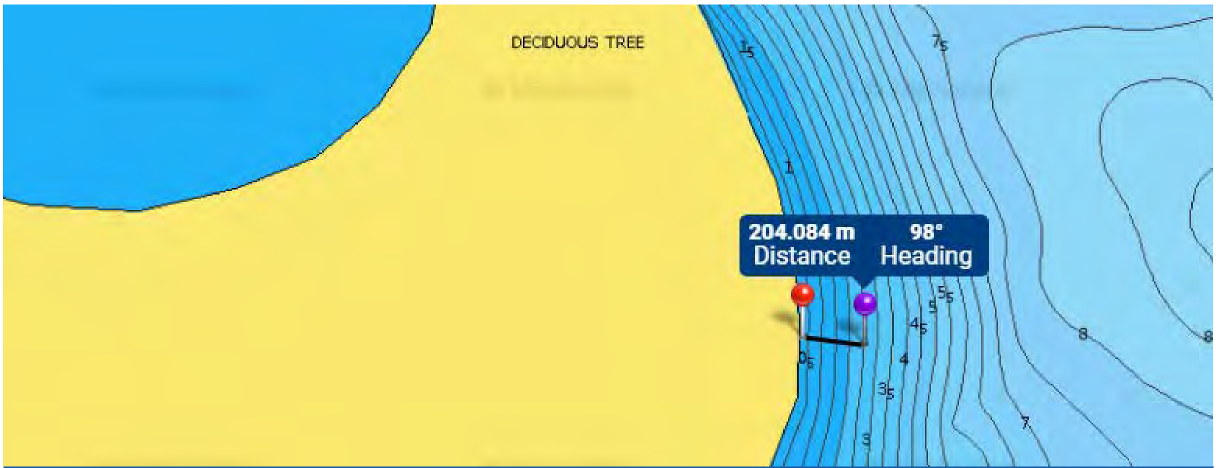
** This landing site is mainly aimed at vehicular traffic; as such, a ferry with capacity for approximately 25 vehicles is envisioned to service this landing site, resulting in a larger vehicle line-up area requirement.

***There is an existing adequate road linking to the RoRo pier location

No dredging works are required at the site, as it is already used as a ferry terminal.

Buwanzi Landing Site, Buvuma County

Development	Current Land Use	Size	Land Ownership
Ticketing Office (red)	Open area with some trees	100 m2	Unknown
Vehicle Parking (green)	Open area with some trees	250 m2	Unknown
Passenger Waiting Area (yellow)	Open area with some trees	350 m2	Unknown
RoRo Pier (grey)	No existing structure; possibly some marsh land	240 m2	Unknown
Access road	Open area with some trees	250 m	Unknown



Item	Value
Distance to CD -2.5m water from shore	200m
Average depth until CD -2.5m water depth is reached	Average of 1.25m water depth (assuming a gradual slope)
Required access channel width	20m (2 times the width of the design vessel)
Required dredging	200m * 1.25m * 20m = 5,000 m3
Issues	None

Buziri, Bukwaya Island, Buvuma

Development	Current Land Use	Size	Land Ownership
Ticketing Office (red)	Area with some trees and some structures nearby	100 m2	Unknown
Vehicle Parking (green)*	n/a	n/a	n/a
Passenger Waiting Area (yellow)	Area with some trees and some structures nearby	350 m2	Unknown
RoRo Pier (grey/light blue)	Area with some trees and some structures nearby	200 m2	Unknown
Access road*	n/a	n/a	n/a

*No vehicle capacity is foreseen for the service connecting to Buziri

Item	Value
Distance to CD -2m water from shore	85m
Average depth until CD -2m water depth is reached	Average of 1m water depth (assuming a gradual slope)
Required access channel width	20m (2 times the width of the design vessel)
Required dredging	85m * 1m * 20m = 1,700 m3
Issues	None

Bwondha, Mayuge

Development	Current Land Use	Size	Land Ownership
Ticketing Office (red)	Open area next to existing structures	100 m2	Unknown
Taxi Parking (green)*	Open area next to existing structures	200 m2	Unknown
Passenger Waiting Area (yellow)	Open area next to and on existing structures	350 m2	Unknown
RoRo Pier (grey/light blue)	Existing pier to be improved; existing pier structure may be privately owned and obstructed by ferry operations	200 m2	Unknown
Access road	n/a; existing road is adequate	100 m	Unknown

*No vehicle waiting area within the ferry area limits, as the Bwondha – Matolo – Golofa will not have vehicle capacity.

Need for dredging to be investigated. The existing pier suggests that larger vessels can already be accommodated.

Ggaba Landing Site, Kampala

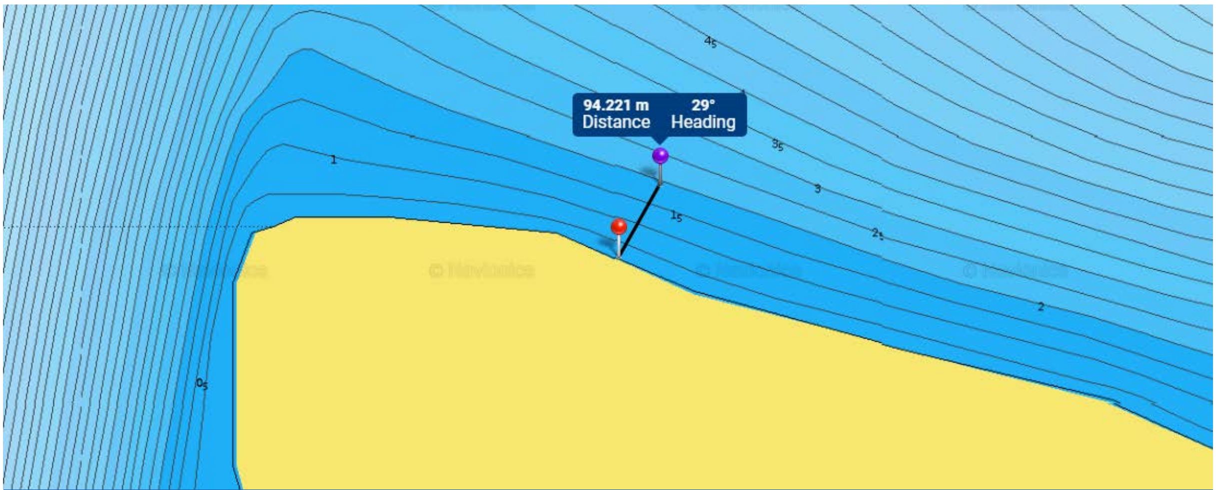
Development	Current Land Use	Size	Land Ownership
Ticketing Office (red)	Open area with some trees	100 m2	Unknown
Vehicle Parking (green)	Open area with many trees	250 m2	Unknown
Taxi Waiting Area outside gate (green)	Open area with many trees	400 m2	Unknown
Passenger Waiting Area (yellow)	Open area with some trees	350 m2	Unknown
RoRo Pier (grey)	No existing structure; potentially marsh land	240 m2	Unknown
Access road	Open area with some trees	150 m	Unknown

Item	Value
Distance to CD -2.5m water from shore	30m
Average depth until CD -2.5m water depth is reached	Average of 1.25m water depth (assuming a gradual slope)
Required access channel width	20m (2 times the width of the design vessel)
Required dredging	30m * 1.25m * 20m = 750m3
Issues	Potentially some rocks to the West (as indicated by red markers)

Gorofa, Lolui Island, Namayingo

Development	Current Land Use	Size	Land Ownership
Ticketing Office (red)	Open area with some trees	100 m2	Public (BMU / LC1)
Vehicle Parking (green)*	n/a	n/a	n/a
Passenger Waiting Area (yellow)	Open area near fishing beach	350 m2	Public (BMU / LC1)
RoRo Pier (grey)	No existing structure; open area	200 m2	Public (BMU / LC1)
Access road	n/a	n/a	n/a

*No vehicle capacity is foreseen for the service connecting to Golofa

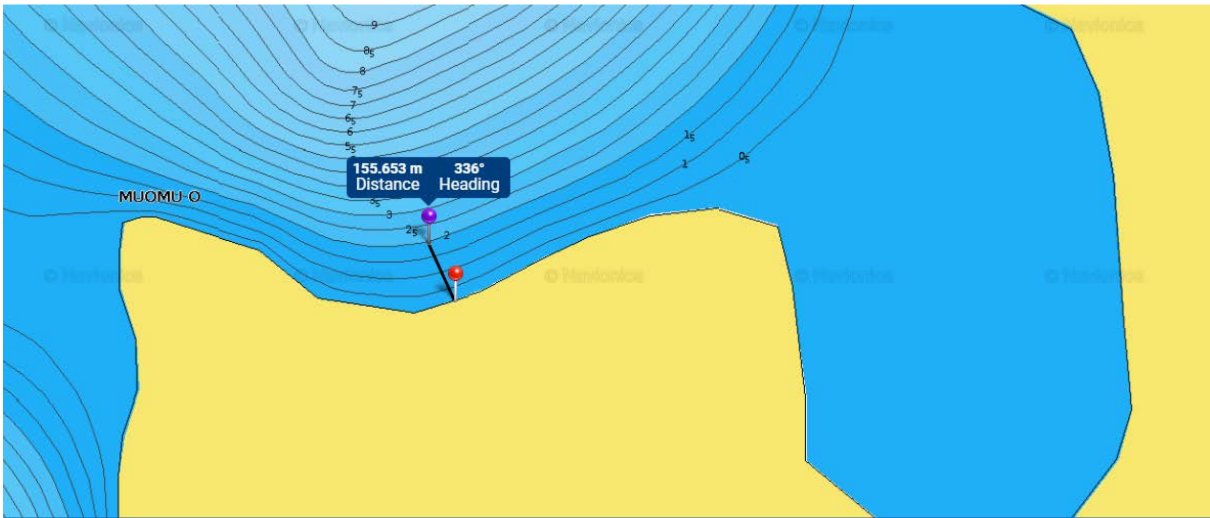


Item	Value
Distance to CD -2m water from shore	100m
Average depth until CD -2m water depth is reached	Average of 1m water depth (assuming a gradual slope)
Required access channel width	20m (2 times the width of the design vessel)
Required dredging	100m * 1m * 20m = 2,000 m3
Issues	None

Kalyambuzi, Damba Island, Mukono

Development	Current Land Use	Size	Land Ownership
Ticketing Office (red)	Some trees and structures	100 m2	Public (MAILO)
Vehicle Parking (green)*	n/a	n/a	n/a
Passenger Waiting Area (yellow)	Some trees and structures	350 m2	Public (MAILO)
RoRo Pier (grey/light blue)	No existing structure; possibly on fishing area	200 m2	Public (MAILO)
Access road*	n/a	n/a	n/a

*No vehicle capacity is foreseen for the service connecting to Damba island



Item	Value
Distance to CD -2m water from shore	150m
Average depth until CD -2m water depth is reached	Average of 1m water depth (assuming a gradual slope)
Required access channel width	20m (2 times the width of the design vessel)
Required dredging	150m * 1m * 20m = 3,000 m3
Issues	None

Katosi, Mukono

Development	Current Land Use	Size	Land Ownership
Ticketing Office (red)	Some trees and a structure	100 m2	Unknown**
Vehicle Parking (green)*	n/a	n/a	n/a
Passenger Waiting Area (yellow)	Some trees	350 m2	Unknown**
RoRo Pier (grey/light blue)	No existing structure; near some trees	200 m2	Unknown**
Access road*	n/a	n/a	n/a

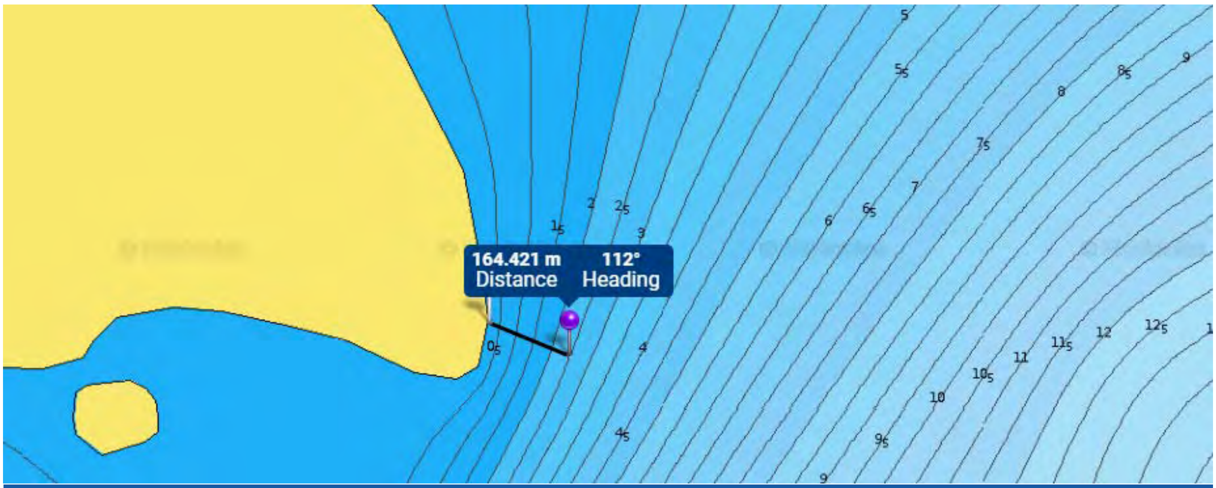
*No vehicle capacity is foreseen for the service connecting to Katosi

**The Katosi landing site itself is partially public land and partially privately owned land (Kabaka); however, the ferry terminal is outside the perimeter of the landing site.

Item	Value
Distance to CD -2m water from shore	1,600m
Average depth until CD -2m water depth is reached	Average of 0.5m water depth (a major share of the channel is approximately CD -0.5m)
Required access channel width	20m (2 times the width of the design vessel)
Required dredging	1,600m * 1.5m * 20m = 48,000 m3
Issues	There may be some rocks to the East of the access channel (the red markers on the figure)

Kigungu Landing Site, Wakiso

Development	Current Land Use	Size	Land Ownership
Ticketing Office (red)	Open area with some trees	250 m2	Unknown
Vehicle Parking (green)	Open area with some trees	300 m2	Unknown
Taxi Waiting Area outside gate (green)	Open area with some trees	900 m2	Unknown
Passenger Waiting Area (yellow)	Open area with some trees	650 m2	Unknown
RoRo Pier (grey)	No existing structure	240 m2	Unknown
Access road	Open area with some trees	1,500 m	Unknown



Item	Value
Distance to CD -2.5m water from shore	160m
Average depth until CD -2.5m water depth is reached	Average of 1.25m water depth (assuming a gradual slope)
Required access channel width	20m (2 times the width of the design vessel)
Required dredging	160m * 1.25m * 20m = 4,000 m3
Issues	None

Kiyindi Landing Site, Buikwe

Development	Current Land Use	Size	Land Ownership
Ticketing Office (red)*	Free plot of land	100 m2	BMU/Buganda Kingdom
Vehicle Parking (green)	Free plot of land, but close to an existing pier structure	625 m2**	BMU/Buganda Kingdom
Passenger Waiting Area (yellow)	Free plot of land, but close to an existing pier structure	350 m2	BMU/Buganda Kingdom
RoRo Pier (grey/light blue)	Existing pier structure	100 m2	BMU/Buganda Kingdom
Access road***	n/a	n/a	n/a

*The ticketing office is only required if the service becomes a paid service

**This landing site is mainly aimed at vehicular traffic; as such, a ferry with capacity for approximately 25 vehicles is envisioned to service this landing site, resulting in a larger vehicle line-up area requirement.

***There is an existing adequate road linking to the RoRo pier location

No dredging works are required at the site, as it is already used as a ferry terminal.

Kyanvubu Landing Site, Wakiso

Development	Current Land Use	Size	Land Ownership
Ticketing Office (red)*	n/a	100 m2	Unknown
Vehicle Parking (green)	Open land on the side of the road	550 m2**	Unknown
Passenger Waiting Area (yellow)	Open land on the side of the road	150 m2***	Unknown
RoRo Pier (grey/light blue)	Existing pier structure	240 m2	Unknown
Access road****	n/a	n/a	n/a

*The ticketing office is only required if the service becomes a paid service

**This landing site will handle a service that is mainly aimed at vehicular traffic; as such, the site should be prepared to accommodate a ferry with capacity for approximately 25 vehicles, resulting in a larger vehicle line-up area requirement.

***Smaller passenger waiting area as the landing site is mainly used by vehicles

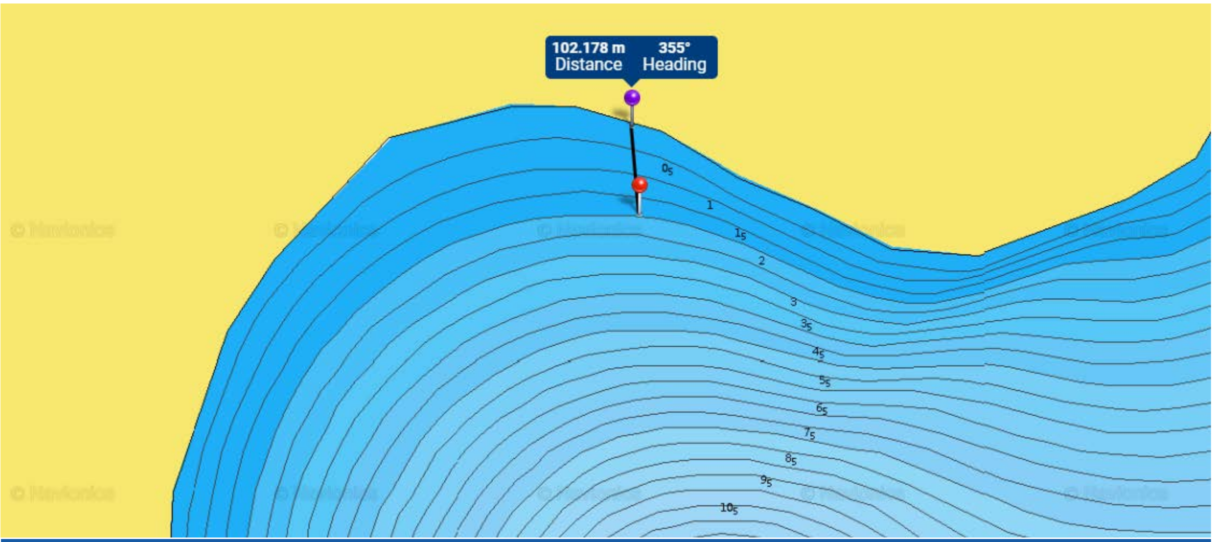
****There is an existing adequate road linking to the RoRo pier location

No dredging works are required at the site, as it is already used as a ferry terminal.

Lubya, Bumuva Island, Buvuma

Development	Current Land Use	Size	Land Ownership
Ticketing Office (red)	Area with some trees and small structures nearby	100 m2	Public (BMU)
Vehicle Parking (green)*	n/a	n/a	n/a
Passenger Waiting Area (yellow)	Area with some trees and small structures nearby	350 m2	Public (BMU)
RoRo Pier (grey/light blue)	No existing structure; on a beach	200 m2	Public (BMU)
Access road*	n/a	n/a	n/a

*No vehicle capacity is foreseen for the service connecting to Lubya



Item	Value
Distance to CD -2m water from shore	100m
Average depth until CD -2m water depth is reached	Average of 1m water depth (assuming a gradual slope)
Required access channel width	20m (2 times the width of the design vessel)
Required dredging	100m * 1m * 20m = 2,000 m3
Issues	None

Lwaji Island, Buvuma

Development	Current Land Use	Size	Land Ownership
Ticketing Office (red)	Area with some trees and some structures nearby	100 m2	MAILO
Vehicle Parking (green)*	n/a	n/a	n/a
Passenger Waiting Area (yellow)	Area with some trees and some structures nearby	350 m2	MAILO
RoRo Pier (grey/light blue)	Area with some trees and some structures nearby	200 m2	MAILO
Access road*	n/a	n/a	n/a

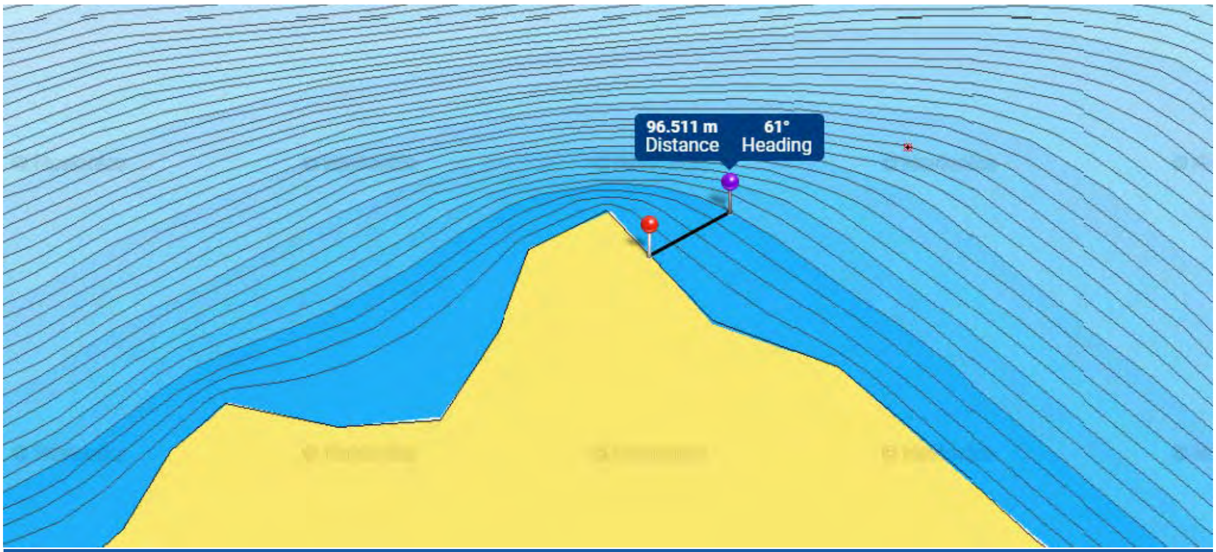
*No vehicle capacity is foreseen for the service connecting to Lwaji Island

Item	Value
Distance to CD -2m water from shore	265m
Average depth until CD -2m water depth is reached	Average of 1m water depth (assuming a gradual slope)
Required access channel width	20m (2 times the width of the design vessel)
Required dredging	265m * 1m * 20m = 5,300 m3
Issues	None

Lyabaana, Buvuma

Development	Current Land Use	Size	Land Ownership
Ticketing Office (red)	Open area, possibly some marsh land	100 m2	Public or leasehold
Vehicle Parking (green)*	n/a	n/a	n/a
Passenger Waiting Area (yellow)	Open area, possibly some marsh land	350 m2	Public or leasehold
RoRo Pier (grey/light blue)	No existing structure	200 m2	Public or leasehold
Access road*	n/a	n/a	n/a

*No vehicle capacity is foreseen for the service connecting to Lyabaana



Item	Value
Distance to CD -2m water from shore	100m
Average depth until CD -2m water depth is reached	Average of 1m water depth (assuming a gradual slope)
Required access channel width	20m (2 times the width of the design vessel)
Required dredging	100m * 1m * 20m = 2,000 m3
Issues	There may be some rocks (but only at substantial water depths)

Masese Landing Site, Jinja

Development	Current Land Use	Size	Land Ownership
Ticketing Office (red)	Existing empty structure	100 m2	Public Land (BMU)
Vehicle Parking (green)	Existing empty structure	250 m2	Public Land (BMU)
Passenger Waiting Area (yellow)	Existing empty structure	350 m2	Public Land (BMU)
RoRo Pier (grey)	Structure to be constructed into the lake	240 m2	Public Land (BMU)

Item	Value
Distance to CD -2.5m water from shore	275m
Average depth until CD -2.5m water depth is reached	Average of 1.25m water depth (assuming a gradual slope)
Required access channel width	20m (2 times the width of the design vessel)
Required dredging	275m * 1.25m * 20m = 6,875 m3
Issues	None

Matolo, Sigulu Island, Namayingo

Development	Current Land Use	Size	Land Ownership
Ticketing Office (red)	Open area with some trees and nearby village	100 m2	Public (BMU / LC1)
Vehicle Parking (green)*	n/a	n/a	n/a
Passenger Waiting Area (yellow)	Open area with some trees and nearby village	350 m2	Public (BMU / LC1)
RoRo Pier (grey/light blue)	No existing structure; possibly some marsh land nearby	200 m2	Public (BMU / LC1)
Access road*	n/a	n/a	n/a

*No vehicle capacity is foreseen for the service connecting to Matolo

Item	Value
Distance to CD -2m water from shore	400m
Average depth until CD -2m water depth is reached	Average of 1m water depth (assuming a gradual slope)
Required access channel width	20m (2 times the width of the design vessel)
Required dredging	400m * 1m * 20m = 8,000 m3
Issues	Potential rocks nearby (to the East)

Nakiwogo Landing Site, Wakiso

Development	Current Land Use	Size	Land Ownership
Ticketing Office (red)	Existing used land with some structures	200 m2*	Public Land
Vehicle Parking (green)	Existing used land with some structures	625 m2**	Public Land
Passenger Waiting Area (yellow)	Existing used land with some structures	500 m2***	Public Land
RoRo Pier (grey/light blue)	Existing pier structure	400 m2	Public Land
Access road****	n/a	n/a	n/a

*The ticketing office is larger than at other sites, as several services will depart from the Nakiwogo site

**This landing site will handle multiple services, including the Nakiwogo – Kyanvubu route that is mainly aimed at vehicular traffic; as such, the site should be prepared to accommodate a ferry with capacity for approximately 25 vehicles, resulting in a larger vehicle line-up area requirement.

***The passenger waiting area is larger than at other sites, as several services will depart from the Nakiwogo site

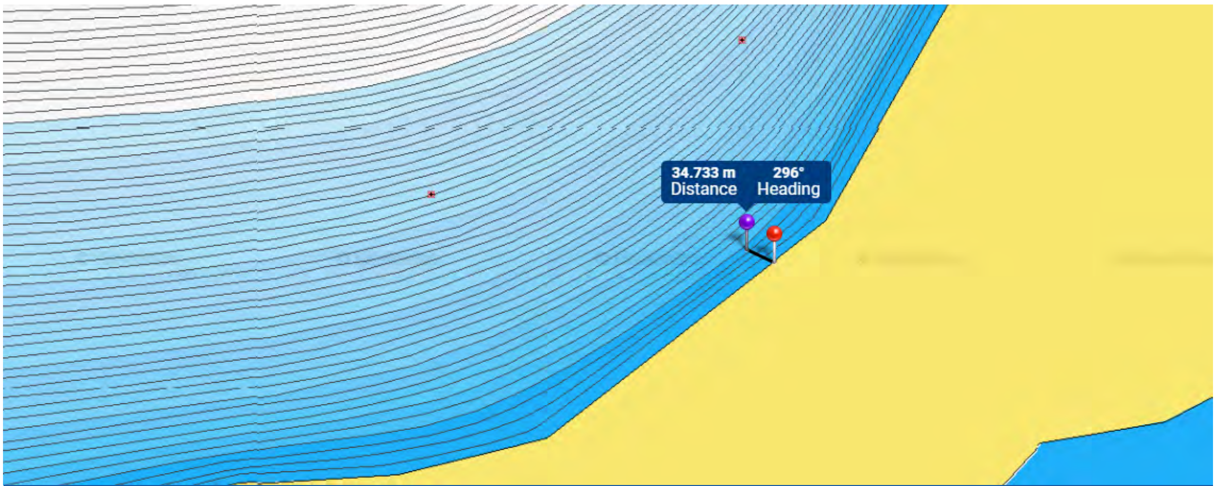
****There is an existing adequate road linking to the RoRo pier location

No dredging works are required at the site, as it is already used as a ferry terminal.

Namisoke, Bubeke Island, Kalangala

Development	Current Land Use	Size	Land Ownership
Ticketing Office (red)	Area with some trees	100 m2	BMU/LC1 MAILO
Vehicle Parking (green)*	n/a	n/a	n/a
Passenger Waiting Area (yellow)	Area with some trees and on a fishing beach	350 m2	BMU/LC1 MAILO
RoRo Pier (grey/light blue)	No existing structure; on a fishing beach	200 m2	BMU/LC1 MAILO
Access road*	n/a	n/a	n/a

*No vehicle capacity is foreseen for the service connecting to Namisoke



Item	Value
Distance to CD -2m water from shore	35m
Average depth until CD -2m water depth is reached	Average of 1m water depth (assuming a gradual slope)
Required access channel width	20m (2 times the width of the design vessel)
Required dredging	35m * 1m * 20m = 700 m3
Issues	There may be some rocks (but only at substantial water depths)

Namoni Landing Site, Mayuge

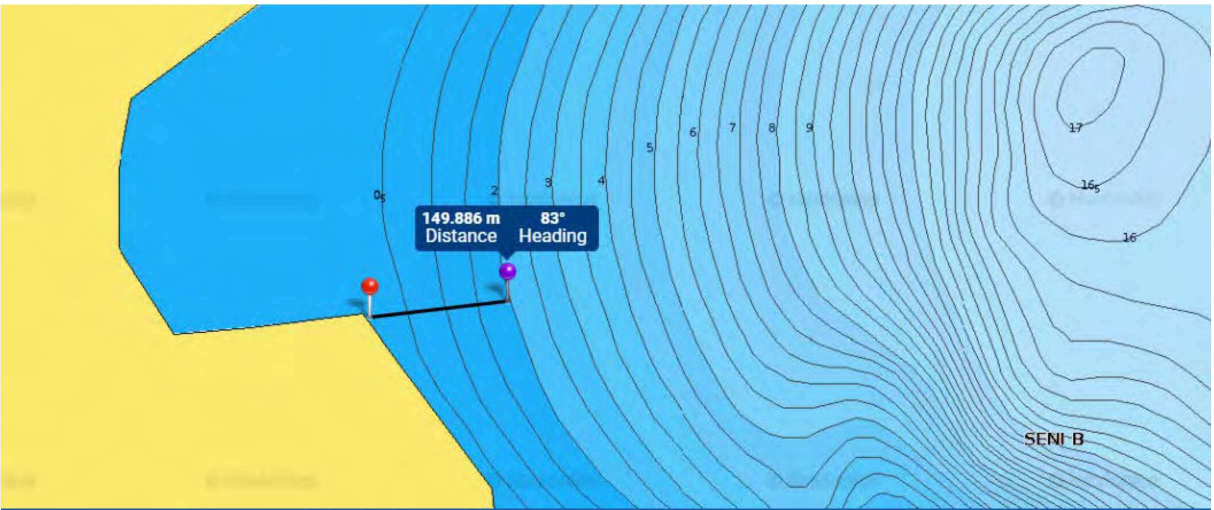
Development	Current Land Use	Size	Land Ownership
Ticketing Office (red)	Open area with some trees	100 m2	Unknown
Vehicle Parking (green)	Open area with some trees	250 m2	Unknown
Passenger Waiting Area (yellow)	Open area with some trees	350 m2	Unknown
RoRo Pier (grey)	No existing structure; possibly some marsh land	240 m2	Unknown
Access road	Open area with some trees	300 m	Unknown

Item	Value
Distance to CD -2.5m water from shore	60m
Average depth until CD -2.5m water depth is reached	Average of 1.25m water depth (assuming a gradual slope)
Required access channel width	20m (2 times the width of the design vessel)
Required dredging	60m * 1.25m * 20m = 1,500 m3
Issues	None

Ssenyi, Buikwe

Development	Current Land Use	Size	Land Ownership
Ticketing Office (red)	Open area with some trees and nearby village / fishing beach	100 m2	Public / MAILO / private
Vehicle Parking (green)*	n/a	n/a	n/a
Passenger Waiting Area (yellow)	Open area with some trees and nearby village / fishing beach	350 m2	Public / MAILO / private
RoRo Pier (grey/light blue)	Open area with some trees and nearby village / fishing beach	200 m2	Public / MAILO / private
Access road*	n/a	n/a	n/a

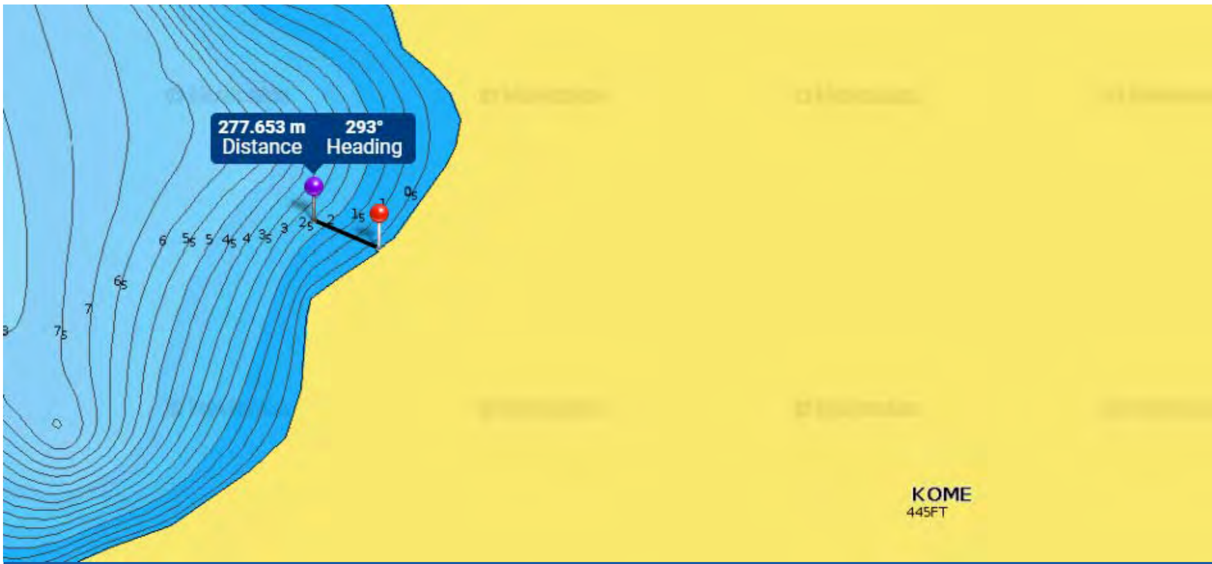
*No vehicle capacity is foreseen for the service connecting to Ssenyi



Item	Value
Distance to CD -2m water from shore	150m
Average depth until CD -2m water depth is reached	Average of 1m water depth (assuming a gradual slope)
Required access channel width	20m (2 times the width of the design vessel)
Required dredging	150m * 1m * 20m = 3,000 m3
Issues	None

Zingoola Landing Site, Mukono

Development	Current Land Use	Size	Land Ownership
Ticketing Office (red)	Open land	100 m2	Public Land (MAILO BMU)
Vehicle Parking (green)	Open land	250 m2	Public Land (MAILO BMU)
Passenger Waiting Area (yellow)	Open land	350 m2	Public Land (MAILO BMU)
RoRo Pier (grey)	No existing structure	240 m2	Public Land (MAILO BMU)
Access road	Open area with some trees	250 m	Public Land (MAILO BMU)



Item	Value
Distance to CD -2.5m water from shore	275m
Average depth until CD -2.5m water depth is reached	Average of 1.25m water depth (assuming a gradual slope)
Required access channel width	20m (2 times the width of the design vessel)
Required dredging	275m * 1.25m * 20m = 6,875 m3
Issues	None

4.2.1.5 Cost Estimates

CAPEX

In line with the site-specific development requirements outlined in section 4.2.1.4, the table below presents a summary of estimated CAPEX for each of the landing sites. Subsequently, Table 4-20 provides a detailed breakdown of CAPEX items for each of the landing sites.

Figure 4.10 Ferry Services - Landing Site CAPEX Summary

Class I Landing Site	Total CAPEX (USD)	Class II Landing Sites	Total CAPEX (USD)
Buwanzi	1,172,500	Buvuma Island	1,303,750
Buziri	681,000	Bwondha	627,500
Ggaba	1,461,250	Kiyindi	766,250
Gorofa	682,500	Kyanvubu	850,000
Kalyambuzi	737,500	Masese	994,375
Katosi	962,500	Nakiwogo	1,561,250
Kigungu	2,457,500	**Total – Class II Landing SItes**	**6,103,125**
Lubya	682,500		
Lwaji Island	699,000		
Lyabaana	682,500		
Matolo	712,500		
Namisoke	676,000		
Namoni	1,192,500		
Ssenyi	912,500		
Zingoola	1,181,875		
Total – Class I Landing SItes	**14,894,125**		

*Excludes class III landing sites, as the Port Bell and Jinja developments are covered in Influence Area C.

Table 4-20 Ferry Services - Landing Site CAPEX

LS*	CAPEX ITEM	VALUE	UNIT	RATE	UNIT	COST (USD)
Buvuma Island						
	Structure Removal	1,075	m2	500	USD / m2	537,500
	Land Leveling	1,075	m2	100	USD / m2	107,500
	Ticketing Office	100	m2	1,000	USD / m2	100,000
	Pavement - Vehicle Parking Area	625	m2	50	USD / m2	31,250
	Pavement - Passenger Waiting Area	350	m2	50	USD / m2	17,500
	Awning - Passenger Waiting Area	1	#	10,000	USD / #	10,000
	Dredging	-	m3	5	USD / m3	-
	RoRo Pier - Passengers and Cars - Upgrade	1	#	500,000	USD / #	500,000
	RoRo Pier - Passengers Only - Upgrade	-	#	250,000	USD / #	-
	RoRo Pier - Passengers and Cars - New	-	#	750,000	USD / #	-
	RoRo Pier - Passengers Only - New	-	#	500,000	USD / #	-
	Access Road	-	Km	750,000	USD / Km	-
	Total CAPEX				**USD**	**1,303,750**
Buwanzi						

LS*	CAPEX ITEM	VALUE	UNIT	RATE	UNIT	COST (USD)
	Structure Removal	-	m2	500	USD / m2	-
	Land Leveling	700	m2	100	USD / m2	70,000
	Ticketing Office	100	m2	1,000	USD / m2	100,000
	Pavement - Vehicle Parking Area	250	m2	50	USD / m2	12,500
	Pavement - Passenger Waiting Area	350	m2	50	USD / m2	17,500
	Awning - Passenger Waiting Area	1	#	10,000	USD / #	10,000
	Dredging	5,000	m3	5	USD / m3	25,000
	RoRo Pier - Passengers and Cars - Upgrade	-	#	500,000	USD / #	-
	RoRo Pier - Passengers Only - Upgrade	-	#	250,000	USD / #	-
	RoRo Pier - Passengers and Cars - New	1	#	750,000	USD / #	750,000
	RoRo Pier - Passengers Only - New	-	#	500,000	USD / #	-
	Access Road	0.25	Km	750,000	USD / Km	187,500
	Total CAPEX				**USD**	**1,172,500**
Buziri						
	Structure Removal	-	m2	500	USD / m2	-
	Land Leveling	450	m2	100	USD / m2	45,000
	Ticketing Office	100	m2	1,000	USD / m2	100,000
	Pavement - Vehicle Parking Area	-	m2	50	USD / m2	-
	Pavement - Passenger Waiting Area	350	m2	50	USD / m2	17,500
	Awning - Passenger Waiting Area	1	#	10,000	USD / #	10,000
	Dredging	1,700	m3	5	USD / m3	8,500
	RoRo Pier - Passengers and Cars - Upgrade	-	#	500,000	USD / #	-
	RoRo Pier - Passengers Only - Upgrade	-	#	250,000	USD / #	-
	RoRo Pier - Passengers and Cars - New	-	#	750,000	USD / #	-
	RoRo Pier - Passengers Only - New	1	#	500,000	USD / #	500,000
	Access Road	-	Km	750,000	USD / Km	-
	Total CAPEX				**USD**	**681,000**
Bwondha						
	Structure Removal	350	m2	500	USD / m2	175,000
	Land Leveling	650	m2	100	USD / m2	65,000
	Ticketing Office	100	m2	1,000	USD / m2	100,000
	Pavement - Vehicle Parking Area	200	m2	50	USD / m2	10,000
	Pavement - Passenger Waiting Area	350	m2	50	USD / m2	17,500
	Awning - Passenger Waiting Area	1	#	10,000	USD / #	10,000
	Dredging	-	m3	5	USD / m3	-
	RoRo Pier - Passengers and Cars - Upgrade	-	#	500,000	USD / #	-
	RoRo Pier - Passengers Only - Upgrade	1	#	250,000	USD / #	250,000
	RoRo Pier - Passengers and Cars - New	-	#	750,000	USD / #	-
	RoRo Pier - Passengers Only - New	-	#	500,000	USD / #	-
	Access Road	-	Km	750,000	USD / Km	-
	Total CAPEX				**USD**	**627,500**
Ggaba						
	Structure Removal	650	m2	500	USD / m2	325,000

LS*	CAPEX ITEM	VALUE	UNIT	RATE	UNIT	COST (USD)
	Land Leveling	1,100	m2	100	USD / m2	110,000
	Ticketing Office	100	m2	1,000	USD / m2	100,000
	Pavement - Vehicle Parking Area	650	m2	50	USD / m2	32,500
	Pavement - Passenger Waiting Area	350	m2	50	USD / m2	17,500
	Awning - Passenger Waiting Area	1	#	10,000	USD / #	10,000
	Dredging	750	m3	5	USD / m3	3,750
	RoRo Pier - Passengers and Cars - Upgrade	-	#	500,000	USD / #	-
	RoRo Pier - Passengers Only - Upgrade	-	#	250,000	USD / #	-
	RoRo Pier - Passengers and Cars - New	1	#	750,000	USD / #	750,000
	RoRo Pier - Passengers Only - New	-	#	500,000	USD / #	-
	Access Road	0.15	Km	750,000	USD / Km	112,500
	Total CAPEX				**USD**	**1,461,250**
Gorofa						
	Structure Removal	-	m2	500	USD / m2	-
	Land Leveling	450	m2	100	USD / m2	45,000
	Ticketing Office	100	m2	1,000	USD / m2	100,000
	Pavement - Vehicle Parking Area	-	m2	50	USD / m2	-
	Pavement - Passenger Waiting Area	350	m2	50	USD / m2	17,500
	Awning - Passenger Waiting Area	1	#	10,000	USD / #	10,000
	Dredging	2,000	m3	5	USD / m3	10,000
	RoRo Pier - Passengers and Cars - Upgrade	-	#	500,000	USD / #	-
	RoRo Pier - Passengers Only - Upgrade	-	#	250,000	USD / #	-
	RoRo Pier - Passengers and Cars - New	-	#	750,000	USD / #	-
	RoRo Pier - Passengers Only - New	1	#	500,000	USD / #	500,000
	Access Road	-	Km	750,000	USD / Km	-
	Total CAPEX				**USD**	**682,500**
Kalyambuzi						
	Structure Removal	100	m2	500	USD / m2	50,000
	Land Leveling	450	m2	100	USD / m2	45,000
	Ticketing Office	100	m2	1,000	USD / m2	100,000
	Pavement - Vehicle Parking Area	-	m2	50	USD / m2	-
	Pavement - Passenger Waiting Area	350	m2	50	USD / m2	17,500
	Awning - Passenger Waiting Area	1	#	10,000	USD / #	10,000
	Dredging	3,000	m3	5	USD / m3	15,000
	RoRo Pier - Passengers and Cars - Upgrade	-	#	500,000	USD / #	-
	RoRo Pier - Passengers Only - Upgrade	-	#	250,000	USD / #	-
	RoRo Pier - Passengers and Cars - New	-	#	750,000	USD / #	-
	RoRo Pier - Passengers Only - New	1	#	500,000	USD / #	500,000
	Access Road	-	Km	750,000	USD / Km	-
	Total CAPEX				**USD**	**737,500**
Katosi						
	Structure Removal	100	m2	500	USD / m2	50,000
	Land Leveling	450	m2	100	USD / m2	45,000

LS*	CAPEX ITEM	VALUE	UNIT	RATE	UNIT	COST (USD)
	Ticketing Office	100	m2	1,000	USD / m2	100,000
	Pavement - Vehicle Parking Area	-	m2	50	USD / m2	-
	Pavement - Passenger Waiting Area	350	m2	50	USD / m2	17,500
	Awning - Passenger Waiting Area	1	#	10,000	USD / #	10,000
	Dredging	48,000	m3	5	USD / m3	240,000
	RoRo Pier - Passengers and Cars - Upgrade	-	#	500,000	USD / #	-
	RoRo Pier - Passengers Only - Upgrade	-	#	250,000	USD / #	-
	RoRo Pier - Passengers and Cars - New	-	#	750,000	USD / #	-
	RoRo Pier - Passengers Only - New	1	#	500,000	USD / #	500,000
	Access Road	-	Km	750,000	USD / Km	-
	Total CAPEX				**USD**	**962,500**
Kigungu						
	Structure Removal	-	m2	500	USD / m2	-
	Land Leveling	2,100	m2	100	USD / m2	210,000
	Ticketing Office	250	m2	1,000	USD / m2	250,000
	Pavement - Vehicle Parking Area	1,200	m2	50	USD / m2	60,000
	Pavement - Passenger Waiting Area	650	m2	50	USD / m2	32,500
	Awning - Passenger Waiting Area	1	#	10,000	USD / #	10,000
	Dredging	4,000	m3	5	USD / m3	20,000
	RoRo Pier - Passengers and Cars - Upgrade	-	#	500,000	USD / #	-
	RoRo Pier - Passengers Only - Upgrade	-	#	250,000	USD / #	-
	RoRo Pier - Passengers and Cars - New	1	#	750,000	USD / #	750,000
	RoRo Pier - Passengers Only - New	-	#	500,000	USD / #	-
	Access Road	1.50	Km	750,000	USD / Km	1,125,000
	Total CAPEX				**USD**	**2,457,500**
Kiyindi						
	Structure Removal	-	m2	500	USD / m2	-
	Land Leveling	1,075	m2	100	USD / m2	107,500
	Ticketing Office	100	m2	1,000	USD / m2	100,000
	Pavement - Vehicle Parking Area	625	m2	50	USD / m2	31,250
	Pavement - Passenger Waiting Area	350	m2	50	USD / m2	17,500
	Awning - Passenger Waiting Area	1	#	10,000	USD / #	10,000
	Dredging	-	m3	5	USD / m3	-
	RoRo Pier - Passengers and Cars - Upgrade	1	#	500,000	USD / #	500,000
	RoRo Pier - Passengers Only - Upgrade	-	#	250,000	USD / #	-
	RoRo Pier - Passengers and Cars - New	-	#	750,000	USD / #	-
	RoRo Pier - Passengers Only - New	-	#	500,000	USD / #	-
	Access Road	-	Km	750,000	USD / Km	-
	Total CAPEX				**USD**	**766,250**
Kyanvubu						
	Structure Removal	250	m2	500	USD / m2	125,000
	Land Leveling	800	m2	100	USD / m2	80,000
	Ticketing Office	100	m2	1,000	USD / m2	100,000

LS*	CAPEX ITEM	VALUE	UNIT	RATE	UNIT	COST (USD)
	Pavement - Vehicle Parking Area	550	m2	50	USD / m2	27,500
	Pavement - Passenger Waiting Area	150	m2	50	USD / m2	7,500
	Awning - Passenger Waiting Area	1	#	10,000	USD / #	10,000
	Dredging	-	m3	5	USD / m3	-
	RoRo Pier - Passengers and Cars - Upgrade	1	#	500,000	USD / #	500,000
	RoRo Pier - Passengers Only - Upgrade	-	#	250,000	USD / #	-
	RoRo Pier - Passengers and Cars - New	-	#	750,000	USD / #	-
	RoRo Pier - Passengers Only - New	-	#	500,000	USD / #	-
	Access Road	-	Km	750,000	USD / Km	-
	Total CAPEX				**USD**	**850,000**
Lubya						
	Structure Removal	-	m2	500	USD / m2	-
	Land Leveling	450	m2	100	USD / m2	45,000
	Ticketing Office	100	m2	1,000	USD / m2	100,000
	Pavement - Vehicle Parking Area	-	m2	50	USD / m2	-
	Pavement - Passenger Waiting Area	350	m2	50	USD / m2	17,500
	Awning - Passenger Waiting Area	1	#	10,000	USD / #	10,000
	Dredging	2,000	m3	5	USD / m3	10,000
	RoRo Pier - Passengers and Cars - Upgrade	-	#	500,000	USD / #	-
	RoRo Pier - Passengers Only - Upgrade	-	#	250,000	USD / #	-
	RoRo Pier - Passengers and Cars - New	-	#	750,000	USD / #	-
	RoRo Pier - Passengers Only - New	1	#	500,000	USD / #	500,000
	Access Road	-	Km	750,000	USD / Km	-
	Total CAPEX				**USD**	**682,500**
Lwaji Island						
	Structure Removal	-	m2	500	USD / m2	-
	Land Leveling	450	m2	100	USD / m2	45,000
	Ticketing Office	100	m2	1,000	USD / m2	100,000
	Pavement - Vehicle Parking Area	-	m2	50	USD / m2	-
	Pavement - Passenger Waiting Area	350	m2	50	USD / m2	17,500
	Awning - Passenger Waiting Area	1	#	10,000	USD / #	10,000
	Dredging	5,300	m3	5	USD / m3	26,500
	RoRo Pier - Passengers and Cars - Upgrade	-	#	500,000	USD / #	-
	RoRo Pier - Passengers Only - Upgrade	-	#	250,000	USD / #	-
	RoRo Pier - Passengers and Cars - New	-	#	750,000	USD / #	-
	RoRo Pier - Passengers Only - New	1	#	500,000	USD / #	500,000
	Access Road	-	Km	750,000	USD / Km	-
	Total CAPEX				**USD**	**699,000**
Lyabaana						
	Structure Removal	-	m2	500	USD / m2	-
	Land Leveling	450	m2	100	USD / m2	45,000
	Ticketing Office	100	m2	1,000	USD / m2	100,000
	Pavement - Vehicle Parking Area	-	m2	50	USD / m2	-

LS*	CAPEX ITEM	VALUE	UNIT	RATE	UNIT	COST (USD)
	Pavement - Passenger Waiting Area	350	m2	50	USD / m2	17,500
	Awning - Passenger Waiting Area	1	#	10,000	USD / #	10,000
	Dredging	2,000	m3	5	USD / m3	10,000
	RoRo Pier - Passengers and Cars - Upgrade	-	#	500,000	USD / #	-
	RoRo Pier - Passengers Only - Upgrade	-	#	250,000	USD / #	-
	RoRo Pier - Passengers and Cars - New	-	#	750,000	USD / #	-
	RoRo Pier - Passengers Only - New	1	#	500,000	USD / #	500,000
	Access Road	-	Km	750,000	USD / Km	-
	Total CAPEX				**USD**	**682,500**
Masese						
	Structure Removal	-	m2	500	USD / m2	-
	Land Leveling	700	m2	100	USD / m2	70,000
	Ticketing Office	100	m2	1,000	USD / m2	100,000
	Pavement - Vehicle Parking Area	250	m2	50	USD / m2	12,500
	Pavement - Passenger Waiting Area	350	m2	50	USD / m2	17,500
	Awning - Passenger Waiting Area	1	#	10,000	USD / #	10,000
	Dredging	6,875	m3	5	USD / m3	34,375
	RoRo Pier - Passengers and Cars - Upgrade	-	#	500,000	USD / #	-
	RoRo Pier - Passengers Only - Upgrade	-	#	250,000	USD / #	-
	RoRo Pier - Passengers and Cars - New	1	#	750,000	USD / #	750,000
	RoRo Pier - Passengers Only - New	-	#	500,000	USD / #	-
	Access Road	-	Km	750,000	USD / Km	-
	Total CAPEX				**USD**	**994,375**
Matolo						
	Structure Removal	-	m2	500	USD / m2	-
	Land Leveling	450	m2	100	USD / m2	45,000
	Ticketing Office	100	m2	1,000	USD / m2	100,000
	Pavement - Vehicle Parking Area	-	m2	50	USD / m2	-
	Pavement - Passenger Waiting Area	350	m2	50	USD / m2	17,500
	Awning - Passenger Waiting Area	1	#	10,000	USD / #	10,000
	Dredging	8,000	m3	5	USD / m3	40,000
	RoRo Pier - Passengers and Cars - Upgrade	-	#	500,000	USD / #	-
	RoRo Pier - Passengers Only - Upgrade	-	#	250,000	USD / #	-
	RoRo Pier - Passengers and Cars - New	-	#	750,000	USD / #	-
	RoRo Pier - Passengers Only - New	1	#	500,000	USD / #	500,000
	Access Road	-	Km	750,000	USD / Km	-
	Total CAPEX				**USD**	**712,500**
Nakiwogo						
	Structure Removal	1,325	m2	500	USD / m2	662,500
	Land Leveling	1,325	m2	100	USD / m2	132,500
	Ticketing Office	200	m2	1,000	USD / m2	200,000
	Pavement - Vehicle Parking Area	625	m2	50	USD / m2	31,250
	Pavement - Passenger Waiting Area	500	m2	50	USD / m2	25,000

LS*	CAPEX ITEM	VALUE	UNIT	RATE	UNIT	COST (USD)
	Awning - Passenger Waiting Area	1	#	10,000	USD / #	10,000
	Dredging	-	m3	5	USD / m3	-
	RoRo Pier - Passengers and Cars - Upgrade	1	#	500,000	USD / #	500,000
	RoRo Pier - Passengers Only - Upgrade	-	#	250,000	USD / #	-
	RoRo Pier - Passengers and Cars - New	-	#	750,000	USD / #	-
	RoRo Pier - Passengers Only - New	-	#	500,000	USD / #	-
	Access Road	-	Km	750,000	USD / Km	-
	Total CAPEX				**USD**	**1,561,250**
Namisoke						
	Structure Removal	-	m2	500	USD / m2	-
	Land Leveling	450	m2	100	USD / m2	45,000
	Ticketing Office	100	m2	1,000	USD / m2	100,000
	Pavement - Vehicle Parking Area	-	m2	50	USD / m2	-
	Pavement - Passenger Waiting Area	350	m2	50	USD / m2	17,500
	Awning - Passenger Waiting Area	1	#	10,000	USD / #	10,000
	Dredging	700	m3	5	USD / m3	3,500
	RoRo Pier - Passengers and Cars - Upgrade	-	#	500,000	USD / #	-
	RoRo Pier - Passengers Only - Upgrade	-	#	250,000	USD / #	-
	RoRo Pier - Passengers and Cars - New	-	#	750,000	USD / #	-
	RoRo Pier - Passengers Only - New	1	#	500,000	USD / #	500,000
	Access Road	-	Km	750,000	USD / Km	-
	Total CAPEX				**USD**	**676,000**
Namoni						
	Structure Removal	-	m2	500	USD / m2	-
	Land Leveling	700	m2	100	USD / m2	70,000
	Ticketing Office	100	m2	1,000	USD / m2	100,000
	Pavement - Vehicle Parking Area	250	m2	50	USD / m2	12,500
	Pavement - Passenger Waiting Area	350	m2	50	USD / m2	17,500
	Awning - Passenger Waiting Area	1	#	10,000	USD / #	10,000
	Dredging	1,500	m3	5	USD / m3	7,500
	RoRo Pier - Passengers and Cars - Upgrade	-	#	500,000	USD / #	-
	RoRo Pier - Passengers Only - Upgrade	-	#	250,000	USD / #	-
	RoRo Pier - Passengers and Cars - New	1	#	750,000	USD / #	750,000
	RoRo Pier - Passengers Only - New	-	#	500,000	USD / #	-
	Access Road	0.30	Km	750,000	USD / Km	225,000
	Total CAPEX				**USD**	**1,192,500**
Ssenyi						
	Structure Removal	-	m2	500	USD / m2	-
	Land Leveling	450	m2	100	USD / m2	45,000
	Ticketing Office	100	m2	1,000	USD / m2	100,000
	Pavement - Vehicle Parking Area	-	m2	50	USD / m2	-
	Pavement - Passenger Waiting Area	350	m2	50	USD / m2	17,500
	Awning - Passenger Waiting Area	1	#	10,000	USD / #	10,000

LS*	CAPEX ITEM	VALUE	UNIT	RATE	UNIT	COST (USD)
	Dredging	3,000	m3	5	USD / m3	15,000
	RoRo Pier - Passengers and Cars - Upgrade	-	#	500,000	USD / #	-
	RoRo Pier - Passengers Only - Upgrade	-	#	250,000	USD / #	-
	RoRo Pier - Passengers and Cars - New	-	#	750,000	USD / #	-
	RoRo Pier - Passengers Only - New	1	#	500,000	USD / #	500,000
	Access Road	0.30	Km	750,000	USD / Km	225,000
	Total CAPEX				**USD**	**912,500**
Zingoola						
	Structure Removal	-	m2	500	USD / m2	-
	Land Leveling	700	m2	100	USD / m2	70,000
	Ticketing Office	100	m2	1,000	USD / m2	100,000
	Pavement - Vehicle Parking Area	250	m2	50	USD / m2	12,500
	Pavement - Passenger Waiting Area	350	m2	50	USD / m2	17,500
	Awning - Passenger Waiting Area	1	#	10,000	USD / #	10,000
	Dredging	6,875	m3	5	USD / m3	34,375
	RoRo Pier - Passengers and Cars - Upgrade	-	#	500,000	USD / #	-
	RoRo Pier - Passengers Only - Upgrade	-	#	250,000	USD / #	-
	RoRo Pier - Passengers and Cars - New	1	#	750,000	USD / #	750,000
	RoRo Pier - Passengers Only - New	-	#	500,000	USD / #	-
	Access Road	0.25	Km	750,000	USD / Km	187,500
	Total CAPEX				**USD**	**1,181,875**

*Excludes Port Bell, as the Port Bell development is covered in Influence Area C.

OPEX

The tables below present the assumptions concerning operating costs related to landing site labour and ferry service overhead costs.

Table 4-21 Opex assumptions for Landing sites

Component	Opex (USD)
Labour	
Landing site operations	1 cashier @ 11,000 USD / year / person
	1 facility manager @ 8,700 USD/year

Table 4-22 Opex assumptions for overhead

Component	Opex (USD)
Labour	
Overhead management	3 senior managers @ 50,000 USD / year / person
	1 operations manager @ 20,000 USD/year
	1 clerk @ 15,000 USD / year
Office space (rental)	12,000 USD /year

4.2.2 Port Bell and Jinja Port Operations under a Landlord Structure ("Influence Area C")

4.2.2.1 Landing Site Selection

For this Influence Area, the Port Bell and Jinja ports are the focal points.

4.2.2.2 Development Requirements

For the assessment of developments at the Port Bell and Jinja ports, the 2015 Master Plans for these ports are considered. From a review of the Master Plans, several general and layout-specific observations are discussed below. Subsequently, the final port layouts, as presented in the Master Plans, are provided in Figure 4.14 and Figure 4.15.

General Observations

- The Port Bell forecast, underlying the technical requirements and layout for Port Bell, only covers a period up to 2020.
- The Port Bell forecast lacks detail or adequate justification.
- A forecast underlying the Jinja port requirements and layout seems to be lacking.

Port Bell Observations

The table below presents of key observations concerning the current state of Port Bell. Subsequently, the Master Plan layout is discussed.

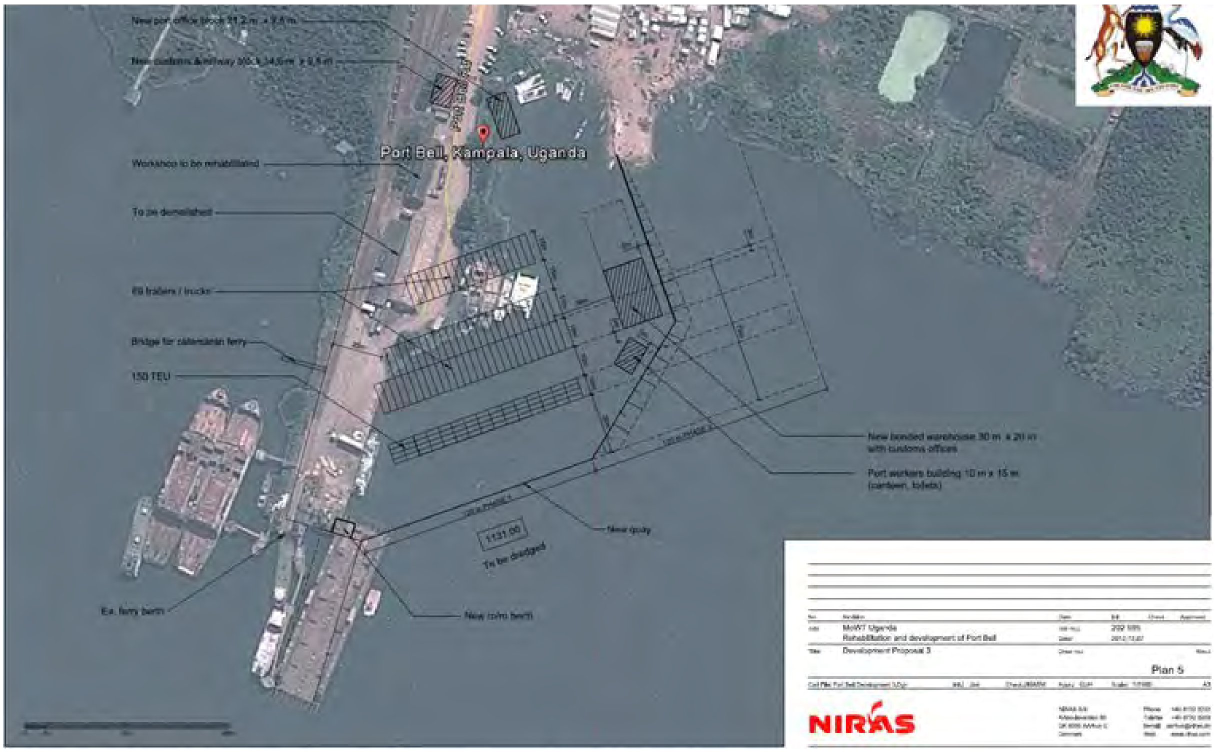
Figure 4.11 Port Bell Observations - Current State

Topic	Observations
Infrastructure	Port access is poor with steep unpaved slope
Infrastructure	Waiting areas for trucks are limited leading to congestion when ships are worked
Infrastructure	Berth length for general cargo insufficient. Basically, only one general cargo ship (or two very small ones) can be moored at a time
Infrastructure	Insufficient berth lengths for mooring of vessels (laid-up vessels and general mooring spaces are too limited)
Infrastructure	Quay quality is poor, bollards are poor and fenders missing
Infrastructure	Terminal area has an inadequate deck with pitfalls due to collapsed drainage systems
Infrastructure	Port area is not large enough to stack containers or to manoeuvre with handling equipment when also a rail ferry is being worked
Infrastructure	The port cannot handle roro vessels due to missing berth (with link span) for roro
Superstructure	Warehouses are in deteriorate stage and need to be replaced. No storage receipt options for cargo from ship or in attendance of vessel arrival.
Superstructure	Restroom and sanitary is outdated
Superstructure	Gate is not adequate when there is inbound and outbound traffic
Navigation	Navigational aids (lighthouse, buoys) are lacking not functioning, vessel can only arrive during daytime
Navigation	Water hyacinth is blocking quay access
Navigation	Approach channel to port requires maintenance dredging
Navigation	Water depth at general cargo quay is poor especially during dry season
Mooring	Mooring jetty structure for the rail ferry is damaged and in poor condition
Operations	No working cranes to assist in unloading/loading. The port is used to handle loose cargoes by hand. There is no equipment to handle containers, mechanically handle loose cargoes nor is there equipment to handle dry bulk or liquid bulk
Operations	Oil pipelines for bunkering of ships do not function any more. The storage tank for bunkers is not working either.
Operations	No equipment for horizontal transport at the terminal (eg. to warehouses)
Operations	Weighing bridges for trucks are missing
Operations	The port cannot work during night time due to insufficient light masts

Operations rail	Rail link span is deteriorated and too narrow for any roro vessels and should be replaced if it needs to accommodate rail ferries in future again.
Operations rail	The rail tracks are metre gauge. The track in the port needs revamping and the track is disconnected from the main railway network due to encroachment. The rail shunting area seems adequate.
Safety and security	There is a fence in poor conditions and security at the gate. Safety procedures and signs are inadequate. The port is not compliant with international ISPS standards
Dry dock	Drydock is located at mooring location which can be used for roro vessels, it is occupying sensitive berth space. Drydock should be relocated in future.

The figure below shows the layout sketch for Proposal 3 of the Port Bell Master Plan document, which has been selected as the preferred development option for Port Bell.

Figure 4.12 Port Bell Master Plan - Proposal 3 Sketch



The observations and recommendations concerning the Port Bell Master Plan layout are presented in the table below. The observations pertain to the preferred development option for Port Bell. Subsequently, Figure 4.13 presents an adjusted version of the Port Bell layout sketch, in line with the recommendations.

Table 4-23 Port Bell Master Plan - Proposal 3 Observations & Recommendations

Topic	Observations & Recommendations
Berths	• In its current form, the linkspan cannot be used properly as a RoRo berth, as it lacks adequate width for typical RoRo vessel ramps. • The selected proposal 3 provides one berth for the rehabilitated rail ferry, one RoRo berth with ramp width of 10m, and a general cargo berth of 120m. The berths are versatile but the question arises whether sufficient roro berths are offered. As RoRo is expected to become/remain the dominant transport option on the lake, another RoRo pier could be added in lieu of one of the general cargo berths. This adaptation likely reduces the land reclamation requirements, quay construction costs and dredging requirements. Additionally, this alternative development results in a shifting of the general cargo quay of approx. 25m.

- The future expansion would offer an additional cargo berth but the option for a second dedicated roro berth is missing. The alternative would be to provide two RoRo berths positioned next to each other (or at least the configuration to provide two roro berths in future)

RoRo Parking

- 69 truck places are considered high for one RoRo berth; a 100m roro vessel would need approximately 40 trucks standing places.
- The location of the parking is not logical. This should be aligned in front of the specific roro berth to enable efficient loading and offloading of trucks, thus increasing the throughput capacity of the berths.
- Once two RoRo berths are offered about 80 truck standing places should be offered, which equals an area of about 2,100 m2 (15m*3.5m*40)

Warehouse

- The warehouse (30m x 20m or 600m2) is placed too close to the possible quay expansion. It is better to locate this nearer to the port entrance, see sketch here below. The warehouse is rather small. Common small transit sheds for general cargo berths are 35m x 70m or 2450 m2.

Apron

- The general cargo berth has an apron of 30m is all right for general cargo berths

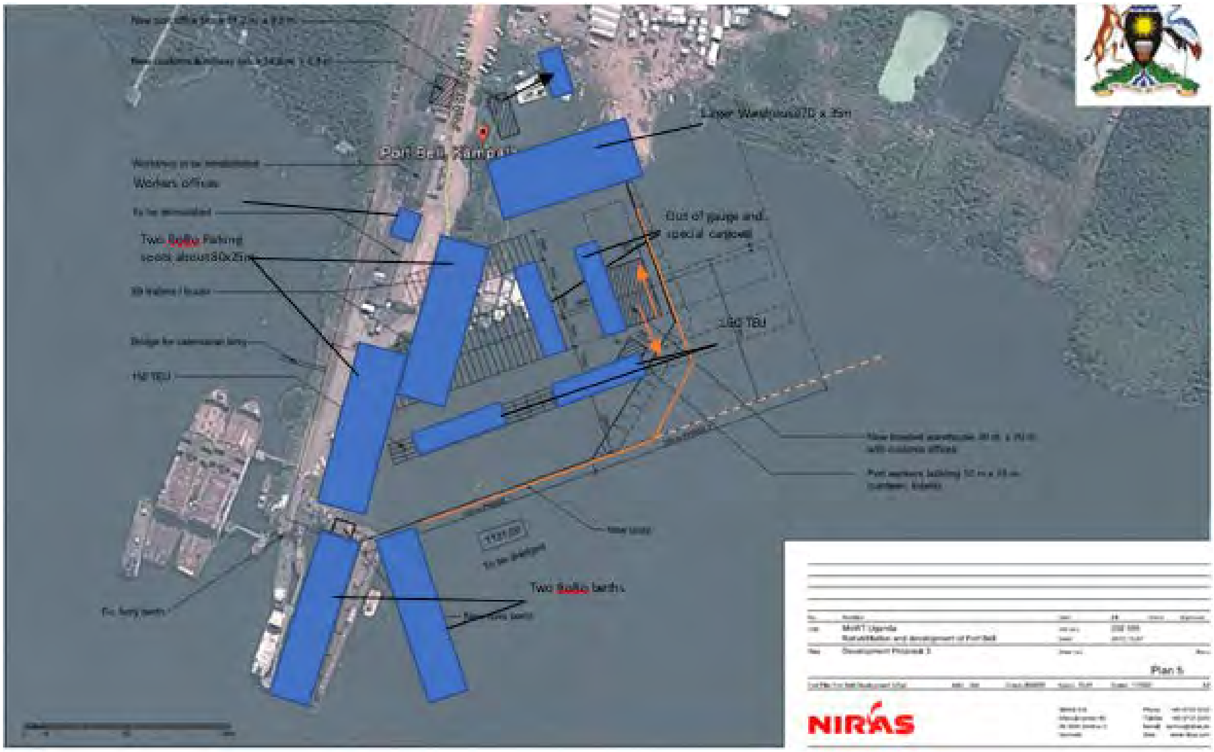
Container stack

- A container stack of 150 TEU for a 120m berth general cargo berth is adequate in view of the moderate container flow through general cargo ships on the lake.
- The drawing shows 60 ground slots. Having on average 2.5 stacking height provides 150 TEU slots. This set up assumes a reach stacker operation which is all right for the port. Empty block stacking and Out of Gauge stacking should be catered for but space for this seems to be available. The future expansion (berth 2) should have the option to assign larger stacking.

Port workers buildings

- The port workers building is located to near to the quay. It may become an obstacle once expansion of the berth 2 is realized. It is better to locate this building nearer to repair workshop which shall be rehabilitated.

Figure 4.13 Port Bell Master Plan - Adjusted Proposal 3 Sketch

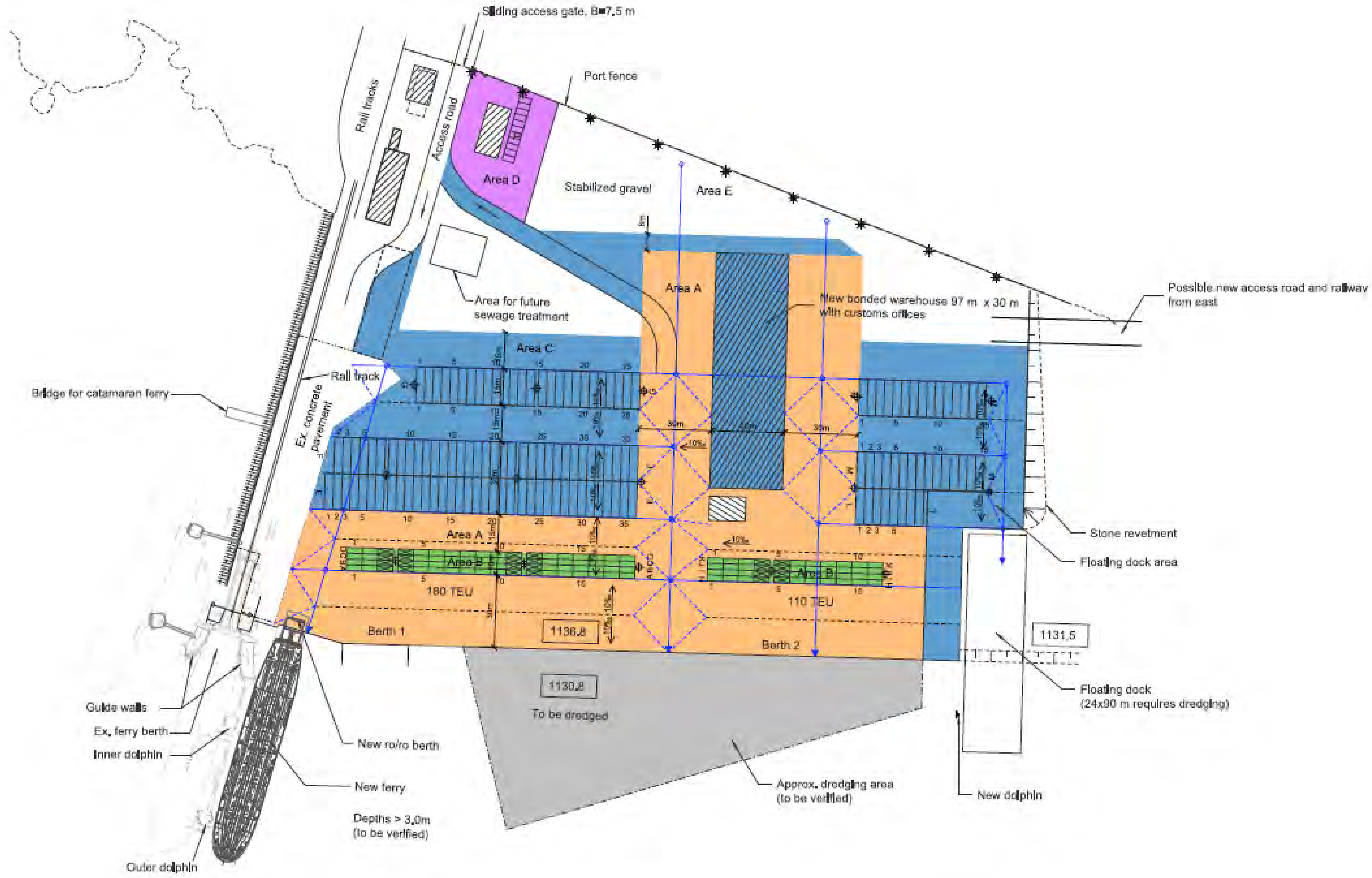


Jinja Port Observations

Observations and recommendations pertaining to Jinja pier are similar to the observations and recommendations presented for Port Bell.

Port Bell Layout

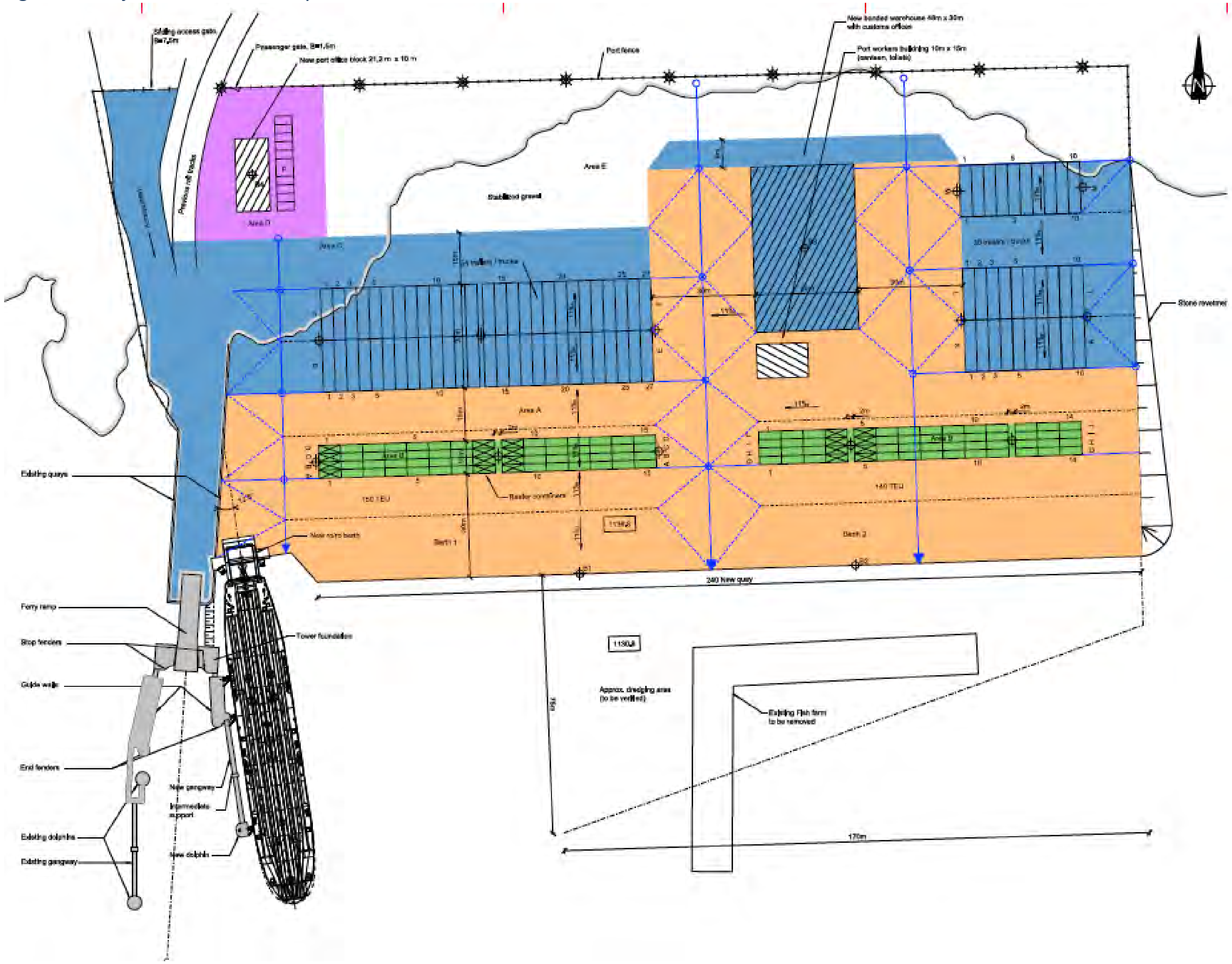
Figure 4.14 Port Bell Master Plan Layout



Source: NIRAS, 2015

Jinja Port Layout

Figure 4.15 Jinja Port Master Plan Layout



Source: NIRAS, 2015

4.2.2.3 Cost Estimates

CAPEX

For the implementation of the port operations in Port Bell and Jinja Pier, there is one main category of capital investment required:

- Rehabilitation of Port Bell and Jinja Pier

The cost estimates for this section are obtained from the Lake Victoria Transportation Programme, of which the high-level cost estimates are included in Annex A of the Terms of Reference. The establishment of emergency service for the lake is funded in a pipeline project of the African Development Bank, and therefore excluded in this cost estimation.

Table 4-24 Capex assumptions for the rehabilitation of Port Bell

Component	Port Bell Estimated amount (USD)	Jinja Pier Estimated amount (USD)
Rehabilitation of ferry berth	120,000	120,000
Buildings	887,000	887,000
Quay extension, filling	2,901,000	2,901,000
Mobilisation, demobilisation (15%)	586,000	586,000
Handling equipment, pallets inc. spares and training	662,000	662,000
Contingencies (20%)	1,031,000	1,031,000
Estimated investment costs	**6,187,000**	**6,187,000**

OPEX

Operating expenditures for the port operations are separated for Port Bell and Jinja Pier, while overhead management costs for Port Bell and Jinja Pier combined (as it is assumed that both ports will be operated by the same party). The following key OPEX categories have been identified:

- Labour
- Overhead electricity, fuel, equipment

The labour OPEX are further detailed in the tables on the next page.

Table 4-25 Opex assumptions for Landing sites

Component	Port Bell Opex (USD/year/person)	Jinja Pier Opex (USD/year/person)
Labour - Port operations	1 cashier @ 11,000 USD	1 cashier @ 11,000 USD
	2 security guards @ 5,800 USD	2 security guards @ 5,800 USD
	1 port manager @ 10,200 USD	1 port manager @ 10,200 USD
	1 assistant manager @ 8,700 USD	1 assistant manager @ 8,700 USD
	4 mooring & unmooring crew @ 7,300 USD	4 mooring & unmooring crew @ 7,300 USD
	1 facility manager @ 8,700 USD	1 facility manager @ 8,700 USD

Table 4-26 Opex assumptions for overhead

Component	Opex (USD)
Labour - Overhead management	3 senior managers @ 50,000 USD / year / person 1 operations manager @ 20,000 USD/year 1 clerk @ 15,000 USD / year

5 Tariff Assessment

Summary
This chapter presents the benchmark analysis of tariffs of current public transportation for the various routes on Lake Victoria, an international benchmark analysis for ferry services and the proposed tariff structure for the three projects.

The proposed tariff structure is a fixed rate per kilometre of 0.10 USD for the general public, and 0.08 USD for children, students and seniors. This rate is higher than what is charged than the wooden passenger boats, as a higher cost needs to be covered. In exchange, passengers get a more reliable and safer ferry service. The routes that are currently offered for free, will remain free. The financial viability gap should be funded by means of a government subsidy.

	Distance (km)	Tariff - general (USD)	Tariff - child / student / senior (USD)
Kyanvubu to Nakiwogo	2	0.20	0.16
Nakiwogo to Zingoola	40	4.00	3.20
Damba island to Port Bell	45	4.50	3.60
Damba Island to Katosi	12	1.20	0.96
Port Bell to Namisoke	21	2.10	1.68
Buvuma to Kiyindi	12	0.00	0.00
Buwanzi to Masese	28	2.80	2.24
Buwanzi to Namoni	11	1.10	0.88
Ssenyi to Buziri	23	2.30	1.84
Ssenyi to Lwaji Island	24	2.40	1.92
Bugaia to Lyabana	6	0.60	0.48
Bwondha to Golofa	40	4.00	3.20
Bwondha to Matolo	39	3.90	3.12

The following table presents the rates for the freight transportation.

Route	General cargo Loose	General cargo Rail wagon	Containers Full TEU	Container Empty TEU
Port Bell - Mwanza	15.70	11.30	450.36	180.42
Port Bell - Kisumu				
Jinja Pier - Mwanza	17.07			
Jinja Pier - Kisumu				

5.1 Introduction

This chapter presents the benchmark analysis of tariffs of current public transportation for the various routes on Lake Victoria, an international benchmark analysis for ferry services and the proposed tariff structure for the three projects. The purpose of this analysis is to provide input for the business cases for the three projects. This chapter consists of the following main components.

- A review of the current tariff structure for ferry services on Lake Victoria and internationally (Section 5.2); An overview of the available current tariffs for freight vessels and the proposed tariffs for freight vessel services (Section 5.3);

5.2 Ferry vessel operations

5.2.1 Current tariffs for ferry services on Lake Victoria

This section presents a review of the current tariff structure for ferry services on Lake Victoria. The analysis comprises ferries vessels and wooden passenger boats. Currently, ferry vessel services are limited to three services. Also, the ferries are known to be unreliable and to be regularly out of service. Therefore, most people are dependent on wooden passenger boats. The wooden transport boats are hand-built and are privately operated.

Figure 5.1 Photos of a wooden transport boat, and two ferries (long range and short range)

Currently, there is a limited amount of ferry services on Lake Victoria by actual ferries. Two private companies and the UNRA operate four routes in total. The UNRA operated ferries are free of charge. An overview of the ferries is presented in the following table.

Table 5-1 Overview of current ropax ferries on Lake Victoria

	Origin	Destination	Operator	Passenger	Vehicle
1.	Nakiwogo	Bugala island	National Oil Distributors	1st class: 14,000UGX 2nd class: 10,000 UGX	50,000 UGX
2.	Bukakata	Luku	Kalangala Infrastructure Services	free of charge	100,000 UGX
3.	Nakiwogo	Kyanvubu	UNRA	free of charge	free of charge
4.	Kiyindi	Buvuma	UNRA	free of charge	free of charge

Ferry services 1 and 2 sail from the mainland to Bugala Island, which is a part of the Ssese Islands. Ferry service 3 sails from Nakiwogo to Kyanvubu, which is a mainland to mainland service. Buvuma is a more centrally located island, five kilometers of the mainland from Kiyindi. The privately-operated ferry services are subsidized.

Wooden passenger boats offer a wide variety of services between islands and the mainland, and between smaller islands, whereas the ferry services are limited to four connections. Hence, people are mainly dependent on the wooden passenger boats. If the stage passenger ferry project is implemented, this will be the substitute of most services currently provided by wooden transport. Therefore, it is relevant to have an understanding of the tariffs currently in place. The wooden passenger boats are nots subsidised.

The following table presents the tariffs of the identified services by wooden passenger boat.

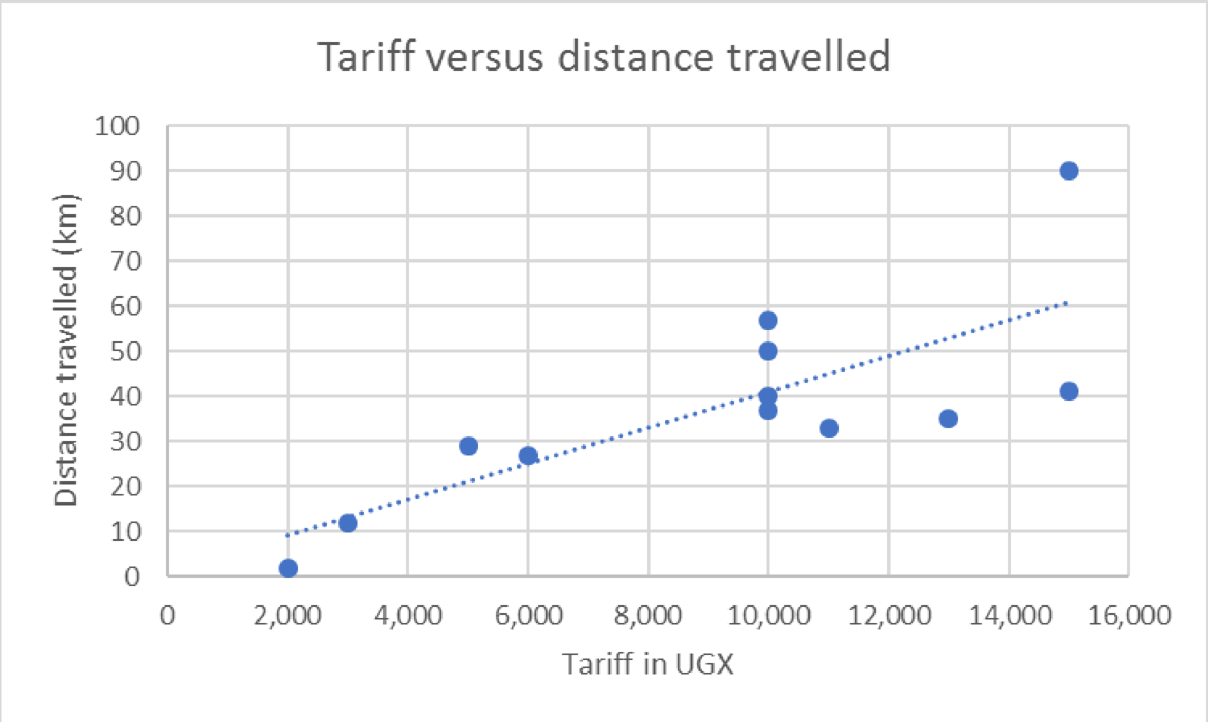
Table 5-2 Overview of identified services provided by wooden passenger boats on Lake Victoria

Origin	Destination	Price (UGX)	Price (USD)	Distance (km)	Tariff (USD/km)
Namisoke	Kasenyi	10,000	2.78	40	0.07
Nakiwogo	Kyanvubu	2,000	0.56	2	0.28
Zingoola	Katosi	11,000	3.06	33	0.09
Zingoola	Kasenyi	6,000	1.67	27	0.06
Jinja	Lubya	10,000	2.78	57	0.05
Golofa	Bwondha	10,000	2.78	37	0.08
Golofa	Lugala	15,000	4.17	41	0.10
Golofa	Ripon	15,000	4.17	90	0.05
Golofa	Wakawaka	10,000	2.78	50	0.06
Matolo	Lugala	3,000	0.83	12	0.07
Lubya	Bwondha	5,000	1.39	29	0.05
Ssenyi	Lyabana	13,000	3.61	35	0.10
Average tariff per km (USD)					**0.09**

Source: RSI (tariffs); Google Earth (Distance); National Population and Housing Census 2014 (Population)

The tariffs for wooden passenger boats range from 2,000UGX to 15,000 UGX. The following figure presents the relationship between tariffs and distance travelled and tariffs. The larger the distance of the trip, the more fuel and time consuming the trip is for the captain. One would expect a positive relationship between the two factors. The figure shows that there is indeed a positive correlation between distance travelled and the tariff for the trip.

Figure 5.2 Comparison of tariff versus distance travelled



5.2.2 International Tariff benchmark

This section presents the international tariff benchmark for ferry services on Lake Victoria. In this section, we discuss the level of tariffs and tariff structure of four different areas in the world. The purpose of the international tariff benchmark is to complement the analysis of current tariffs in Lake Victoria with an overview of tariffs in the Democratic Republic of the Congo on Lake Kivu, the Philippines, Indonesia and the Caribbean.

The selected areas show similarities to Uganda with respect to consisting of multiple small islands and a mainland or main island. They show similarities with respect to the dependency on ferry transportation of local population (instead of solely for touristic purposes). And lastly, they show similarities to Uganda with respect to the duration of trips being not more than six hours. For sake of comparison, the tariffs are converted from local currency to USD.

The following table summarises the tariffs per km in USD for the four selected benchmark regions, weighed with GDP per capita for each country.

Table 5-3 International ferry tariff benchmark

	Uganda (wooden passenger boats)	DRC	Philippines	Indonesia	Caribbean
Average observed tariff per km	0.09	0.10	0.11	0.05	1.16
GDP per capita	642	474	3,102	3,895	15,838
Benchmark	0.000140	0.000211	0.000035	0.000013	0.000073

The international tariff benchmark shows that the tariffs on Lake Kivu are lower, even though the GDP per capita is lower. Furthermore, the benchmark shows that there is no linear relationship between the average tariff per kilometer and GDP per capita.

Lake Kivu

On Lake Kivu, four ferry operators serve the Goma - Bukavu line. Three operators have a similar structure and tariffs: Emanuel, Mugote and Akonkwa. The three operators run a combined fleet of 38 vessels and an identical tariff structure, as presented in the table below. The operators handle passengers, passenger related cargo and unaccompanied cargo. The three operators offer night-time services of 12 hours at low speed, and daytime services of 5.5 hours at normal speed. The capacity of the vessels is 200 passengers and 15 tons of cargo per vessel. The fourth operator, Ihushi Express, offers exclusively fast ferry services for passengers. The fleet consists of three vessels with a capacity of 50 people per vessel. The service takes only 2.5 to 3 hours. All four ferry operators are privately operated. In both Goma and Bukavu the operators have their own terminals, accommodating passengers, passenger related cargo and unaccompanied cargo. The tariffs are determined through an unofficial agreement with the government of the DRC.

The following table presents the tariffs for the four main operators of the Goma - Bukavu line on the DRC side of Lake Kivu.

Table 5-4 Tariff structure on DRC side of Lake Kivu

	General (USD)	3rd class (USD)	2nd class (USD)	1st class (USD)	Tariff/km
Standard speed ferries					
Emanuel	10	12	15	25	0.10
Mugote	10	12	15	25	0.10
Akonkwa	10	12	15	25	0.10
Fast ferry					
Ihushi express				50	0.50

Distinction is made in the tariff structure for different classes, and the option is offered to book a guaranteed seat upfront at a premium: the general ticket doesn't, and the 3rd, 2nd and 1st class tickets come with a guaranteed seat. Tariff per kilometre is on par with the tariffs in Uganda, except the Ihushi Express. The Ihushi Express is a fast ferry, which travels twice as fast as the standard speed ferries. The ferries do not offer transport for vehicles.

Philippines

With more than 7,000 islands, the ferry is a common mode of transport for passengers in the Philippines. Private companies operate the ferries, with most routs being operated by multiple companies. From capital Manila, there are ferry services to the fourteen main ports. From these major ports, smaller ferries offer services to the smaller islands, the so-called hub and spoke model). Ferry operators in the Philippines typically charge different rates for children, students and seniors.

With multiple operators competing on a route, one could expect lower prices. However, the Philippines case doesn't show lower tariffs on competitive routes. On some routes, one operator charges more than double the tariff of its direct competitor. This could be due to a better, more reliable service. Also, operators don't copy competitors' discounts for students, seniors and children. Also in the Philippines, tariffs are closely related to the distance of the route.

The following table presents the tariffs for a selection of routes in the Philippines.

Table 5-5 Tariff structure of a selection of routes in the Philippines

Operator	Standard Passenger	Student/senior	Child	Tariff / km
Batangas City to Calapan, Oriental Mindoro 44km				
Montenegro Shipping Lines	4.70			0.11
Starlite ferries	3.60	3.50	2.10	0.08
Besta Shipping Lines	3.60	2.80	1.80	0.08
Roxas, Oriental Mindoro to Caticlan, Aklan 88km				
Montenegro Shipping Lines	13.60			0.15
Starlite	8.50	7.60	5.50	0.10
Philharbor	6.50	5.50	3.30	0.07
Dumangas, Iloilo to Bacolod Negros Occidental 25 km				
Jomalia Shipping Corp	1.80			0.07
Millenium Shipping	2.40			0.09

Operator	Standard Passenger	Student/senior	Child	Tariff / km
Montenegro Shipping	4.90			0.20
Dumaguete, Negros Oriental to Dapitan, Zamboanga del Norte 72 km				
Montenegro Shipping Lines	12.10			0.17
Cokialong Shipping	7.30			0.10
Cawayan, Masbate to Bogo, Cebu 123km				
Asian Marine Transport	9.90			0.08
Cebu City to Tubigon Bohol 38km				
Sunline Shipping	3.80			0.10
Island Shipping Corp	3.60	2.50	2.50	0.09
Life Shipping Corp	3.40			0.09
Jagna, Bohol to Balbagon, Mambajao 56 km				
Asian Marine Transport	7.90			0.14
Benoni, Mahinog to Balingoan, Misamis 22km				
Philstone Shipping Corporation	3.00			0.13
DaveMyr Shipping Company	3.00	2.50		0.13
Cataingan, Masbate to Naval, Biliran 65km				
Montenegro Shipping Lines	6.90			0.11
Average tariff per km (USD				**0.11**

Indonesia

Indonesia comprises 17,000 islands and sea transport is extremely important for economic integration and for domestic and foreign trade. Each of the major islands have at least one major port. The ferry services can be divided in three categories: the big passenger ferries operated by state-owned PT Pelni carrying up to 5,000 passengers; privately owned steel boats making up the bulk of Indonesia's larger-sized passenger boat fleet. They typically have three decks and can legally carry up to 500 people. The third category is big engine speed boats that service tourists in the more touristic area of Bali and the Gili Islands. For this analysis, he privately owned steel boats are the most relevant in terms of travelling distance and type of passengers. The following table presents the tariffs for a selection of routes in Indonesia. All ferry services are operated by ASDP Indonesia.

Table 5-6 Tariff structure of a selection of routes in Indonesia

Origin / destination	Standard passenger (USD)	Child (USD)	Truck (16m) (USD)	Distance (km)	Tariff / km (USD)
Padangbai to Lembar	3.45	2.18	340.35	52	0.07
Jepara to Karimunjawa	4.13	2.33	142.50	78	0.05
Singkil to Pulau Banyak	1.86	0.97	134.07	52	0.04
Singkil to Gunung Sitoli	3.98	1.88	347.03	78	0.05
Singkil to Sinabang	3.00	1.88	201.75	65	0.05
Gorontalo to Pagimana	5.10	3.45	492.83	143	0.04
Gorontolo to Wakai	4.80	3.08	322.73	156	0.03

Origin / destination	Standard passenger (USD)	Child (USD)	Truck (16m) (USD)	Distance (km)	Tariff / km (USD)
Ketapang to Gilimanuk	0.49	0.34	54.90	9.75	0.05
Ujung to Kamal	0.38	0.26	15.00	6.5	0.06
Surabaya to Lombok	6.53	4.65	545.93	260	0.03
Average tariff per km (USD)					**0.05**

Caribbean

Inhabitants of the Caribbean islands rely on ferry transport for affordable inter-island connections, as flights are expensive. The ferry network is in development. Currently, a mix of privately and publicly operated ferries operate in the Caribbean region. The Antigua to Montserrat (1) route and the Trinidad to Tobago route (6) are subsidised.

Table 5-7 Tariff structure for the ferry services in the Caribbean region

	Origin / destination	Operator	Standard Passenger	Child	km	Tariff / km
1.	Antigua to Montserrat	Jaden Sun	55.55	27.78	39	1.42
2.	Heritage to Barbuda	Barbuda Express	45.00	40.00	29	1.55
3.	St. Luciato Martinique to Dominica to Guadeloupe	Express des Iles	87.00	50.00	*50	1.74
4.	Grenada to Carriacou	Osprey Lines	31.00	19.00	36	0.86
5.	Carriacou to Petite Martinique	Osprey Lines	8.00	4.00	6	1.33
6.	Trinidad to Tobago	TTIT	7.42	3.71	90	0.08
	Average tariff per km (USD)					**1.16**

*) Average distance between the islands

5.2.3 Proposed tariff structure

The proposed tariff structure is a fixed rate per kilometre of 0.10 USD for the general public, and 0.08 USD for children, students and seniors. This rate is higher than what is charged than the wooden passenger boats, as a higher cost needs to be covered. In exchange, passengers get a more reliable and safer ferry service. The routes that are currently offered for free, will remain free. The financial viability gap should be funded by means of a government subsidy.

The investments and the running costs of the ferry operations need to be recovered over time. Costs can be recovered by the passengers through tariffs, by the government through subsidy or, most likely, by a combination of the two. Cost recovery entirely through tariffs will result in high tariffs: Cost estimates in chapter 3 showed that substantial investments in additional vessels and in the infrastructure and superstructure on the landside are required for the project. High tariffs will result in passengers not willing and/or being able to pay for the ferries. Cost recovery through governmental subsidies is what currently is applied to the Nakiwogo to Bugala Island service (MV Kalangala), as shown in the review of current tariffs. The rationale for the fully subsidised ferry according to the UNRA, is that it is a continuation of the road infrastructure, and therefore shouldn't be charged for. A fully subsidised ferry system would lead to high costs for the government, whereas the review of current tariffs shows that there is a willingness to pay for the ferries. Therefore, we propose a partly subsidised tariff structure.

In other countries, tariffs are calculated on the concept of a 'Road Equivalent Tariff' (RET). This concept has been applied for more than thirty years. The ferry to an island and the piers are, in fact, parts of a flexible road over which passengers can pass to and from islands. The rationale is as follows: payment of road tax entitles road drivers to drive anywhere on the road system. Tax is used to construct and maintain roads. Roads go everywhere, except for islands. If it were possible to build roads to islands it would have been done. Islanders pay road tax but are uniquely denied access to the road system without paying a substantial ferry surcharge. To be fair, the cost to the islander of the ferry crossing is related to the cost of travelling along an equitable length of road. A formula was created to translate this concept into a linear ferry charge. It includes a 'toll' equivalent to 4 kilometres of distance, similar to road users for exceptional capital expenditure such as certain bridge crossings.

The tariffs for the selected ferry routes are presented in the table below.

Table 5-8 Tariffs for ferry routes

Route	Distance (km)	Tariff - general (USD)	Tariff - child / student / senior (USD)
Kyanvubu to Nakiwogo	2	0.20	0.16
Nakiwogo to Zingoola	40	4.00	3.20
Damba island to Port Bell	45	4.50	3.60
Damba Island to Katosi	12	1.20	0.96
Port Bell to Namisoke	21	2.10	1.68
Buvuma to Kiyindi	12	0.00	0.00
Buwanzi to Masese	28	2.80	2.24
Buwanzi to Namoni	11	1.10	0.88
Ssenyi to Buziri	23	2.30	1.84
Ssenyi to Lwaji Island	24	2.40	1.92
Bugaia to Lyabana	6	0.60	0.48
Bwondha to Golofa	40	4.00	3.20
Bwondha to Matolo	39	3.90	3.12

5.3 Freight vessel operations

This section presents the available information on the tariff structure for freight vessel operations on Lake Victoria. Because most of the freight vessels operate in the tramp market, freight rates fluctuate. They reflect not only long-term supply-demand imbalances, but also day-to-day ones. MSC is the only company which publishes its freight rates, and even then is obliged to offer discounts at times of over-capacity. Its published freight rates were last revised in November 2011, and are shown in the following table. These are, however, no more than indicative. When freight rates went up as a result of the Bakhresa wheat traffic, MSC's Mwanza-Port Bell rate was increased to 35,000 UGX (22 USD per ton); after the termination of that traffic rates fell sharply and in October 2014 were around 25,000 UGX (15.20USD per ton), slightly below MSC's published rates. The range of reported freight rates is quite wide, but rates fluctuate so much – and shippers' memories are so short - that it is doubtful whether further interviews would clarify the situation. We therefore propose that sensitivity tests are used in the financial model to examine the effects of freight rate variations.

Table 5-9 Observed freight rates on Lake Victoria

Route	General cargo Loose	General cargo Rail wagon	Containers Full TEU	Container Empty TEU
Port Bell - Mwanza	15.70	11.30	450.36	180.42
Port Bell - Kisumu				
Jinja Pier - Mwanza	17.07			
Jinja Pier - Kisumu				

Source: RHDV Haskoning

6 Initial Environmental, Social and Climate Change Assessment

Summary

The high level environmental and social impact assessment for the due diligence for the private sector participation in Lake Victoria Transport Program is aimed at identifying critical environmental and social risks that may affect the potential projects. It involved carrying out site visits to a number of the sites where interviews and observations were used to gather information, which was analyzed descriptively and thematically to accomplish the environmental and social impact assessment. For the sites that could not be visited, interviews were organized to gather required data.

It was generally found that all the proposed sites can be developed as suggested; some sites are already under similar use, while others are already getting prepared for the proposed developments. There are likely environmental issues in most of the sites, especially related to waste management, erosion and pollution, but these can be mitigated.

In terms of vegetation, there is little, if any, existing vegetation at any of the proposed development sites. However, where vegetation exists, there is no restriction in removing the vegetation as it exists at other sites either nearby or far away. The only risk is the potential for erosion, which has to be mitigated if vegetation removal occurs as part of the developments. Similarly, fauna found at the sites, such as birds and reptiles, is not threatened and has sufficient areas where it can relocate once the developments start.

There is sufficient land to accommodate all the proposed developments at each of the sites. However, there may be a need to enter into some negotiations, as land ownership of some of the proposed sites is still under contention or even in courts. Displacement of a few people will also have to be carried out at some sites, although some of the current settlements at sites are not legally placed there.

The following sites were found to have characteristics that may pose issues for the envisioned developments:

- Katosi landing site – There are cultural values attached to the site; however, the owner of the land is willing to relocate the cultural site once there is an agreement with the proposed developer.
- Ggaba landing site – The Ggaba site comprises wetlands and a populated area.
- Kigungu landing site – There are contested land claims regarding this site; additionally, the area encompasses a cultural site.
- Buwanzi landing site – Agricultural land has been identified at the site.
- Namoni landing site – Agricultural land has been identified at the site.
- Goroda landing site – The area is near an archeological site.

As such, these sites will need to be further studied in detail, in order to ascertain their suitability for development.

Due to the size of the full preliminary ESIA study, it has been attached in Appendix VII for the purpose of readability.

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7 Legal Due Diligence

Summary

The table below provides an overview of the institutional and regulatory documents that have been reviewed for the Legal framework review. Additionally, key observations pertaining to the envisioned PPP projects are summarized.

Topic	Documents Assessed	Key Observations
PPP Projects	• PPP Act (2015) • PPP Framework (2010)	• There seems to be a well-structured process for implementing and coordinating PPP Projects. • Section 12 sub 3 of the PPP Act may restrict some forms of public financial support to PPP projects.
Water Transport Activities	• Lake Victoria Transport Regulations (2010) • Inland Water Transport Control Act (1939) • Ferries Act (1905) • Inland Water Transport Bill (2017)	• There are no regulatory restrictions that should be removed to enable the envisioned activities • Cooperation between the MoWT PPP implementation team and the Transport Licencing Board is encouraged to ensure consistency between the PPP agreement and licence conditions. • Vessel operating licences typically have 1-year renewable terms. Such a short term may induce risks related to the inability of renewing an operating licence during the PPP project operations period. • There is currently no Merchant Shipping Act in Uganda to organise port and shipping activities. The Inland Water Transport Bill will act as Uganda's equivalent of the Merchant Shipping Act, as it is enacted in, inter alia, Kenya and Tanzania.
Development Locations	• Fish (Beach Management) Rules (2003)	• It is unclear whether the envisioned passenger transport landing site developments can be implemented under the current BMU structure

Subsequently, the table below summarises key legal and institutional issues that have been identified from the legal framework review and the review of current PPP agreements. Additionally, mitigation measures for each of the issues are provided.

Issue	Mitigation Measure
There is currently no merchant shipping act in place to organise the port and shipping activities in Uganda.	The 2017 Inland Water Transport Bill is currently being drafted. This piece of legislation will act as Uganda's equivalent of a Merchant Shipping Act.
Annual shipping licence renewal requirements may pose a threat to private ferry operators, as a cancellation of such a licence may prohibit the operators from carrying out their ferry activities, despite a potential long-term PPP agreement being in place.	The MoWT should absorb this risk, as it can control the relevant licencing authority (Transport Licencing Board). The PPP agreement between the GoU and KIS already includes such a measure, as it stipulates that KIS is ensured to obtain its annual licence, as long as it complies with the necessary conditions outlined in the Inland Water Transport Control Act.
it is unclear whether the envisioned passenger transport landing site developments can be implemented under the current BMU structure	It should be assessed whether the Fish (Beach Management) Rules allow for envisioned landing site developments, or that additional steps are required to enable such developments.
Potential issues with non-compliance of private parties with requirements set forth in a PPP agreement.	The PPP agreement should clearly identify breaches of the PPP agreement and resulting consequences, such as penalties or early termination of the PPP agreement. In section 7.5, examples of such breaches and penalties are provided for each of the 3 Influence Areas.

The Legal Due Diligence consists of the following 5 main components:

- A review of Uganda's current legal and institutional frameworks that impact the envisioned PPP projects (section 7.1).
- A benchmark of Uganda's ease of doing business (section 7.2).
- A review of Uganda's previous and current PPP projects (section 7.3).
- A summary of key challenges and mitigation measures (section 7.4).
- An overview of potential KPIs to monitor private party performance (section 7.5).

7.1 Review of Legal and Institutional Frameworks

For the review of the legal and institutional frameworks in Uganda, the following key topics are assessed:

- General PPP framework and legislation – the PPP legislation is reviewed to assess the general viability of implementing PPP projects in Uganda.
- Inland water transport regulations – the review of inland water transport regulations aims to identify any obstacles to implementing water transport activities on Lake Victoria.
- Beach area development regulations – as the majority of preferred locations are beach areas, Beach Management Unit (BMU) regulations are reviewed to identify any obstacles to redeveloping such areas.

The table below provides an overview of the institutional and regulatory documents that have been reviewed for each of the identified topics. Additionally, key observations pertaining to the envisioned PPP projects are summarized.

Table 7-1 Legislation Review Overview

Topic	Documents Assessed	Key Observations
PPP Projects	• PPP Act (2015) • PPP Framework (2010)	• There seems to be a well-structured process for implementing and coordinating PPP Projects. • Section 12 sub 3 of the PPP Act may restrict some forms of public financial support to PPP projects.
Water Transport Activities	• Lake Victoria Transport Regulations (2010) • Inland Water Transport Control Act (1939) • Ferries Act (1905) • Inland Water Transport Bill (2017)	• There are no regulatory restrictions that should be removed to enable the envisioned activities • Cooperation between the MoWT PPP implementation team and the Transport Licencing Board is encouraged to ensure consistency between the PPP agreement and licence conditions. • Vessel operating licences typically have 1-year renewable terms. Such a short term may induce risks related to the inability of renewing an operating licence during the PPP project operations period. • There is currently no Merchant Shipping Act in Uganda to organise port and shipping activities. The Inland Water Transport Bill will act as Uganda's equivalent of the Merchant Shipping Act, as it is enacted in, inter alia, Kenya and Tanzania.
Development Locations	• Fish (Beach Management) Rules (2003)	• It is unclear whether the envisioned passenger transport landing site developments can be implemented under the current BMU structure

The documents summarized in the table above will be assessed in more detail in subsequent sections, in the following order:

- Uganda PPP Act (section 7.1.1)
- PPP Framework (section 7.1.2)
- Lake Victoria Transport Regulations (section 7.1.3)
- Inland Water Transport Control Act (section 7.1.4)
- Ferries Act (section 7.1.5)
- Inland Water Transport Bill (section 7.1.6)
- Fish (Beach Management) Rules (section 7.1.7)

7.1.1 Uganda PPP Act (2015)

As stated at the outset of the PPP Act, the PPP Act is:

"An Act to provide for Public Private Partnership agreements; to establish Public Private Partnership Committee and Public Private Partnership Unit; to establish a Project Development Facilitation Fund provide for the functions of contracting authorities, accounting officers, project officers, project teams and evaluation committees; to provide for the role of the private party in a public private partnership; to provide for the management of public private partnerships; to provide for project inception and feasibility studies for public private partnerships; to provide for the procurement of public private partnerships; to provide for the disqualification of bidders and the evaluation of public private partnership bids; to provide for public private partnership agreements and the monitoring of projects; to provide for the bidding methods, procurement procedures and types of public private partnership agreements and for related matters."

The following relevant topics from the PPP Act will be further discussed in this section:

- Allowance for Water Transport PPP Projects
- Allowance for MoWT as Contracting Authority
- PPP Project Coordination
- PPP Models Permitted
- Allowance for Public Financing in PPPs

Allowance for Water Transport PPP Projects

The Uganda PPP Act, enacted on the 5th of August 2015, explicitly confirms the allowance for water transport PPP projects to be implemented. Thereto, section 2.1.a states:

"This Act shall apply to all public private partnerships and in particular shall apply to the design, construction, maintenance and operation of infrastructure or services provided under the following projects –

a. road, rail, subway, water and air transport facilities, including harbour and port facilities, airports and airport facilities"

Conclusion: no issues exist regarding the general allowance for implementation of water transport PPPs.

Allowance for MoWT as Contracting Authority

A PPP project can be implemented by any authorized government contracting authority, including government departments, ministries, or any other body established by Government and mandated to carry out a public function. Hence, a PPP project can be initiated and implemented by the MoWT.

Conclusion: no issues exist regarding the allowance for MoWT to implement a PPP.

PPP Project Coordination

To ensure proper implementation of PPP projects, a Public Private Partnerships Committee (PPP Committee) and Public Private Partnerships Unit (PPP Unit) have been established under sections 5 and 10 of the PPP Act, respectively. The PPP Committee and PPP Unit fall under the responsibility of the Ministry of Finance.

The main responsibilities of the PPP committee and PPP unit include:

- PPP committee: tasked with high level oversight of the PPP projects implemented. Specific tasks include
    - validating consistency of proposed PPP projects with the PPP Act;
    - ensuring that proposed projects are in line with national priorities;
    - updating the overarching PPP policies and guidelines;
    - assessing the feasibility studies and implementation procedures of PPP projects; and
    - overseeing the project monitoring functions of contracting authorities.

- PPP Unit: The PPP unit acts as the "secretariat and technical arm" of the PPP committee. As such, the PPP unit holds the main responsibility for daily decision making regarding PPP projects. Specific tasks include
  - promoting awareness of PPPs among stakeholders;
  - advising (and assisting, where necessary) contracting authorities on implementing and coordinating PPP projects;
  - screening PPP projects and maintaining a high-quality PPP project pipeline;
  - identify process gaps to continuously improve the PPP project implementation process;
  - assisting the PPP committee in drafting new guidelines and standard documentation to be incorporated in the PPP Act;
  - monitor contingent liabilities and budgetary issues related to PPP projects; and
  - put in place measures to optimize the potential value that can be derived from PPP projects.

Furthermore, a PPP project team is to be established by contracting authorities for each specific envisioned PPP project. The PPP project team is mainly responsible for:

- appraising the project to ascertain its legal, regulatory, social, economic, and commercial viability;
- checking the project agreements' compliance with provisions of the PPP act;
- monitoring the implementation of the agreement entered into by the contracting authority;
- liaising with stakeholders;
- overseeing management of the project, in accordance with the PPP agreement; and
- submitting periodic performance reports to the PPP Unit.

Conclusion: dedicated entities and processes are in place to guide PPP implementation, resulting in a clear and consistent process.

PPP Models Permitted

The PPP Act provides explicit guidance on which PPP structures can be used in specific cases; these structures include:

- concessions (section 38);
- operation and maintenance agreements (section 39);
- lease, develop and operate agreements (section 40);
- build, own and maintain agreements (section 41);
- build, own, operate and transfer agreement (section 42);
- design, build, finance and operate agreements (section 43); and
- build, own and operate agreements (section 44).

However, flexibility to introduce PPP structures that are not listed in the aforementioned sections is retained through section 45 of the PPP Act, which states that "any other type of public private partnership agreement" can be used to implement projects.

Conclusions: no issues exist concerning potential PPP structures, although several (common) structures seem to be preferred.

Allowance for Public Financing in PPPs

The PPP Act allows for a contracting authority to partake in financing of a PPP project, through monetary contributions (section 12, sub 2a), partially or fully conceding the use of assets belonging to the contracting authority or government (section 12, sub 2b), or assigning the right to operate assets belonging to the contracting authority or government (section 12, sub 2c).

However, section 12 sub 3 restricts some forms of financial support to PPP projects, through the following decree:

"For the avoidance of doubt, Government or a contracting authority shall not borrow, guarantee or raise a loan for a public private partnership, except as authorised by Article 159 of the Constitution."

Conclusion: Viability Gap Funding from the contracting authority/Government may be limited; additionally, loans from International Financing Institutions (such as the World Bank) towards implementing PPP projects may be impeded.

7.1.2 PPP Framework (2010)

The current version of the PPP framework was implemented in 2010. As stated in section 1.5 of the PPP framework, the principle features include:

"clear statements of the scope, principles and aims for the use of Public-Private Partnerships, the identification of key project implementation issues and a clear recognition of the critical role of social partnership and stakeholder consultation in underpinning the success of Public-Private Partnerships. The Policy Framework also makes provision for monitoring and evaluation of PPP projects."

As such, the topics discussed in the PPP framework are largely the same as the content of the 2015 PPP Act, albeit in less detail.

The PPP framework indicates a number of PPP structures can be used by contracting authorities, which are listed in Appendix A. The potential structures include:

- Design, Build, Finance and Operate contracts;
- concession contracts;
- sale and lease back contracts;
- lease contracts; and
- Joint Ventures.

In contrast to the 2015 PPP Act, no category is included that allows for "other PPP structures" to be implemented. However, other structures than those mentioned in the PPP framework are not explicitly prohibited.

Conclusion: The PPP framework covers many of the same topics covered in the 2015 PPP Act. It seems that no provision is made for all imaginable PPP structures, as is the case in the PPP Act. As the newer PPP Act should be followed for final guidance, this should not be an issue. Additionally, all typical PPP structures are explicitly allowed in both the PPP Act and the PPP framework.

7.1.3 Lake Victoria Transport Regulations (2010)

The envisioned shipping activities on Lake Victoria are governed by the Lake Victoria Transport Regulations (2010). This document does not hamper the envisioned activities. however, a multitude of requirements are set for the vessels to be used, including:

- certification of vessels;
- required life-saving appliances and arrangements;
- construction requirements;
- machinery and pump requirements;
- minimum stability tests;
- fire protection equipment;
- communication equipment; and
- navigational equipment.

Conclusion: The Lake Victoria Transport Regulations do not hamper the envisioned shipping activities. However, several requirements regarding vessels need to be taken into account when detailing designs of vessels to be implemented.

7.1.4 Inland Water Transport Control Act (1939)

The Inland Water Transport Control Act aims to *"restrict and control the carriage of goods and passengers by water within Uganda"*, as stated in the introduction of the Act. In this light, the Act is mainly concerned with licensing procedures for vessels operating within Ugandan waters. The Act covers the following relevant topics regarding the water transport licences:

- Licence application considerations.
- Conditions of licences.
- Duration of licences.
- Exclusive licences.

Licence Application Considerations

Section 6 of the Act covers points of consideration regarding licence applications. The following points are considered relevant for the envisioned activities:

- Objections to applications – Section 6 sub 2 states that the Transport Licencing Board will review any objections made to licences for providing transport services on specific routes, if the entity filing the objection is already operating on the same route. Such a consideration lowers the threat of new entrants, thus slightly reducing market risk for investors.
- Cross-country services – Section 6 sub 5 states that the Transport Licencing Board will correspond with its peers in Kenya and/or Tanzania if a licence is requested for passenger or cargo transport services on routes that are partially situated in the territorial waters of these countries. Hence, this section confirms the ability of the Transport Licencing Board to grant licences for cross-country water transport services.

Conditions of Licences

Section 7 of the Act discusses conditions that may be imposed on a licence, as granted by the Transport Licencing Board. The following conditions are considered particularly relevant for the envisioned cargo and passenger transport activities on Lake Victoria:

- Specification of operational area – Section 7 sub 1a states that the Transport Licencing Board may decide that a vessel may not be operated in certain areas or on certain routes. Such a condition can confine envisioned ferry vessels to their routes, resulting in less competitive risk for private operators in case different routes are operated by different operators (if each operator is confined to their own route, they cannot use their vessels to operate on routes of other operators). It is noted that routes will also be specified clearly in PPP contracts. As such, the PPP project team of the MoWT should cooperate with the Transport Licencing Board to ensure consistency.
- Specification of charges – Section 7 sub 1c covers potential conditions for specific tariffs or tariff ranges to be applied to carriage of goods. Such a condition may restrict opportunistic behaviour by private parties, as it impedes introduction of excessive tariffs. As “goods” is to be interpreted as goods or burden of any description, conform section 1 sub b of the Act, such a condition may also be applied for passenger transport. It is noted that tariffs or tariff ranges will likely also be specified clearly in PPP contracts. As such, the PPP project team of the MoWT should cooperate with the Transport Licencing Board to ensure consistency.
- Specification of employee conditions – Section 7 sub 1d covers potential conditions pertaining to salaries, working conditions, and working hours of employees on the licenced vessels. Such conditions may protect the employees’ interests.

Duration of Licences

Conform section 9 of the Act, every licence, other than a short-term licence, shall continue in force for one year from the date on which it is expressed to take effect. This means that licences need to be renewed on an annual basis. As substantial vessel investments are envisioned from private operators, and these investments cannot be easily reused or liquidated in the case that a licence is not renewed, a licencing risk arises that may negatively affect the value of the PPP contract. As the Transport Licencing Board falls under the responsibility of the MoWT, the MoWT can control the Transport Licencing Board processes and is best suited to absorb this risk. The envisioned PPP agreement should clearly identify how to handle a situation where the private party is unable to renew its licence during the operational period of the PPP project.

Exclusive Licences

Section 4 of the Act bestows the Transport Licencing Board with the authority to grant an exclusive licence for passenger or cargo transport in a specific area or on a specific route. Such an exclusive licence substantially reduces market risk resulting from the threat of new entrants. As there is substantial market risk in the pilot stage of the ferry services development, due to the lack of accurate market data, exclusive licences may be especially beneficial for such pilot projects.

Conclusion:

In order to mitigate issues that may arise if an operator under a PPP concession cannot get a renewed licence during the concession, the concession agreement should clearly identify how to handle such a situation. As the Transport Licencing Board falls under the responsibility of the MoWT, the MoWT can control the Transport Licencing Board processes and is best suited to absorb this risk. Exclusive licences may be beneficial for pilot ferry projects, if market risk is (partially) allocated to operators.

7.1.5 Ferries Act (1905)

According to section 1 of the Ferries Act, the Act applies to *"any vessel which is not a ship as defined for the purposes of the Inland Water Transport (Control) Act."* As the definition of a ship in the Inland Water Transport (Control) Act includes all vessels used in navigation not propelled by oars or peddles, the Ferries Act applies to vessels that are propelled by oars and peddles. Hence, the regulations set forth in this Act do not apply to the vessels envisioned for the ferry activities.

Conclusion: The Ferries Act is not relevant for the envisioned ferry system development.

7.1.6 Inland Water Transport Bill (2017)

Currently, a new piece of legislation is being drafted by the First Parliamentary Council. The Bill, which will be named the Inland Water Transport Bill, comprises a substantial overhaul and extension of the current water transportation legislation. Inter alia, the Bill is expected to arrange:

- partial implementation of the 2007 Lake Victoria Transport Act;
- the establishment of a new Ports Regulator, which will absorb the responsibility of the country's ports from the Uganda Railways Corporation (URC); and
- the establishment of a Maritime Administration, which will be responsible for port policy.

Conclusion: As no draft is accessible to the Consultant at the time of writing this report, the impact of the new legislation on the envisioned PPP projects cannot be accurately assessed.

7.1.7 Fish (Beach Management) Rules (2003)

The majority of locations that have been selected for the envisioned passenger ferry activities are governed by the Fish (Beach Management) Rules (2003). These rules mainly address the authority and responsibilities of a Beach Management Unit (BMU), the governing authority of a beach area.

The BMU falls under the authority of the Minister responsible for fisheries and, as such, is tasked mainly with activities pertaining to fisheries. Amongst others, a BMU is responsible for:

- recording boat owners and their equipment;
- cooperate with licensing officers in the licensing procedure for boat owners and fishers;
- ensure safety guidelines for fishing operations;
- record and grant permission to visiting boats to land at the beach area;
- develop and enforce fisheries bylaws;
- manage fisheries through prohibiting activities in specific areas;
- conduct patrols in the area;
- develop local fisheries and beach development plans;
- cooperate with other agencies for capacity building concerning fisheries;
- arbitrate in fisheries disputes;
- record and retain fisheries data; and
- record and retain BMU financial data.

The tasks do not specifically mention the restructuring or redevelopment of a beach area for uses other than fishery related activities. Only the rather vague "beach development plan" responsibility may provide room to introduce other types of activities to the beach area. However, the lack of articulated redevelopment procedures will not likely result in major issues, as the BMUs fall under the authority of the GoU. As such, the lands can be redistributed to other Government agencies if so required.

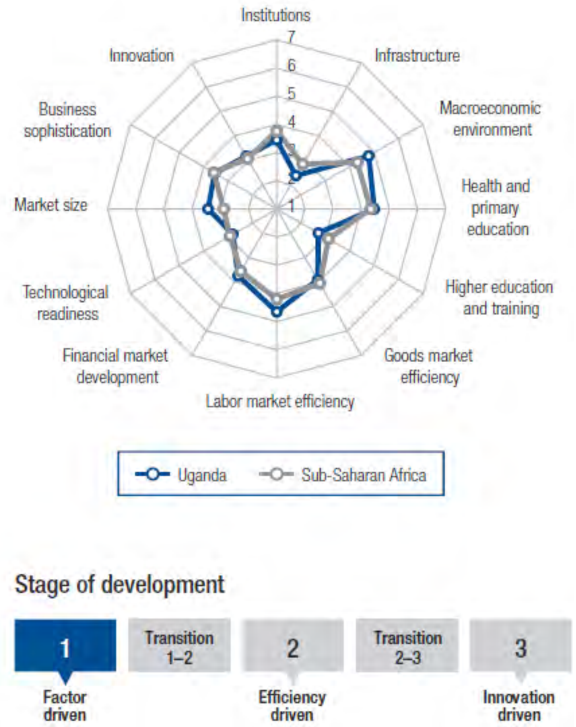
Conclusion: no severe issues arise from the Fish (Beach Management) Rules; however, it is unclear whether the envisioned passenger transport landing site developments can be implemented under the current BMU structure.

7.2 Country Competitiveness Benchmark

A country's development level is a key factor of private sector appetite for PPP projects. According to World Economic Forum data, Uganda is ranked 115th out of 140 countries on the overall 2016 Global Competitiveness Index (GCI). The figure below provides an overview of Uganda's performance on each of the development factors included in the GCI scoring.

Figure 7.1 Global Competitiveness Index - Uganda Performance

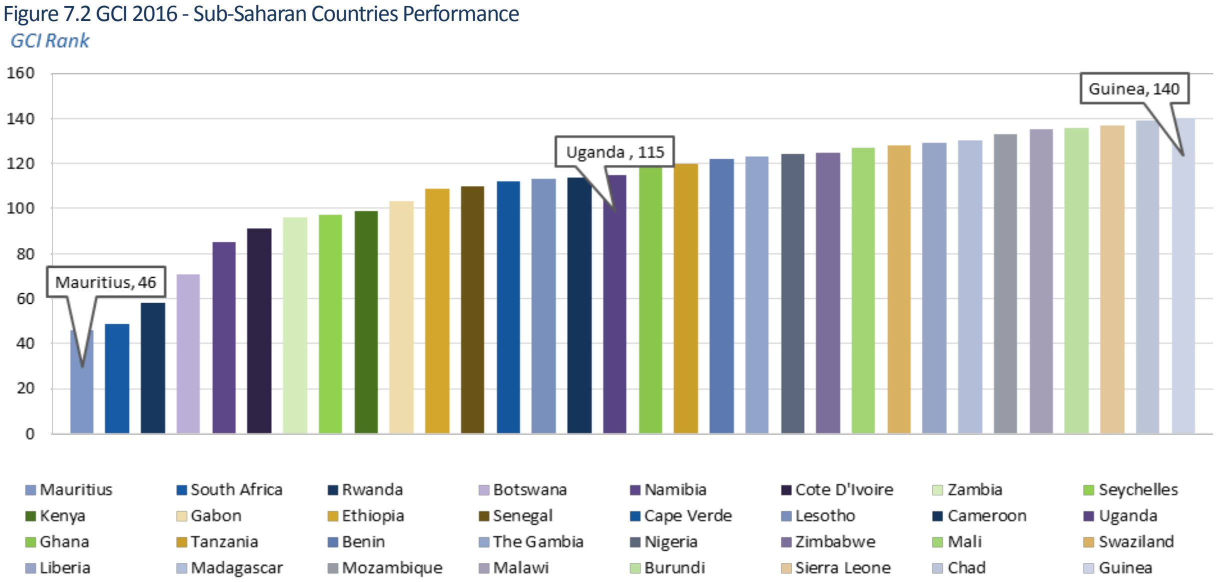
	Rank (out of 140)	Score (1–7)
GCI 2015–2016	**115**	**3.7**
GCI 2014–2015 (out of 144)	122	3.6
GCI 2013–2014 (out of 148)	129	3.4
GCI 2012–2013 (out of 144)	123	3.5
Basic requirements (60.0%)	**117**	**3.8**
1st pillar: Institutions	101	3.4
2nd pillar: Infrastructure	128	2.4
3rd pillar: Macroeconomic environment	67	4.8
4th pillar: Health and primary education	120	4.5
Efficiency enhancers (35.0%)	**109**	**3.5**
5th pillar: Higher education and training	130	2.7
6th pillar: Goods market efficiency	120	3.9
7th pillar: Labor market efficiency	27	4.6
8th pillar: Financial market development	81	3.7
9th pillar: Technological readiness	117	2.8
10th pillar: Market size	82	3.4
Innovation and sophistication factors (5.0%)	**100**	**3.3**
11th pillar: Business sophistication	107	3.5
12th pillar: Innovation	85	3.2



Source: World Economic Forum, 2016

Subsequently, Figure 7.2 provides an overview of 2016 GCI ranks for all 32 reported Sub-Saharan African countries. It can be observed that Mauritius is the highest performer in the sample, with a GCI rank of 46 globally. In contrast, Guinea has the lowest performance, with a global GCI rank of 140. The average GCI rank of the Sub-Saharan countries amounts to 110.5; the median GCI rank amounts to 117. With the 115th place globally, Uganda's performance is thus considered average in the region.

Figure 7.2 GCI 2016 - Sub-Saharan Countries Performance



7.3 PPP Implementation Experience & Capacity

7.3.1 General PPP Projects

In Uganda's recently established National Development Plan II, focusing on the country's development plans for the period from 2015/2016 to 2019/2020, PPP projects have been identified as important tools for sustainable development.

Since 1990, Uganda has completed a total of 34 unique PPP projects with total estimated investments of USD 4.8 Bn. The largest share of investments is in the ICT sector, with approximately USD 2.9 Bn of the total USD 4.8 Bn investments taking place in this sector (see the figure on the right). The transport sector PPP refers to a railway project; as such, it seems that the water transport PPPs are not reported.

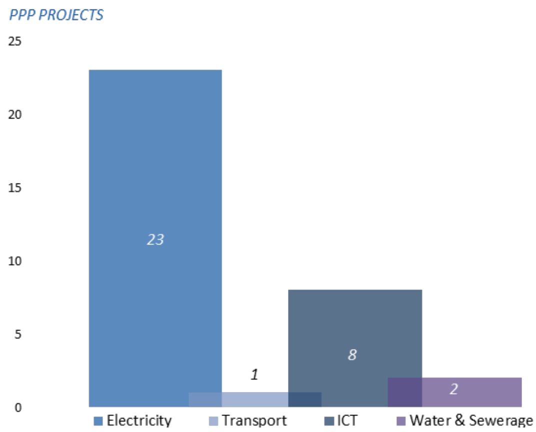
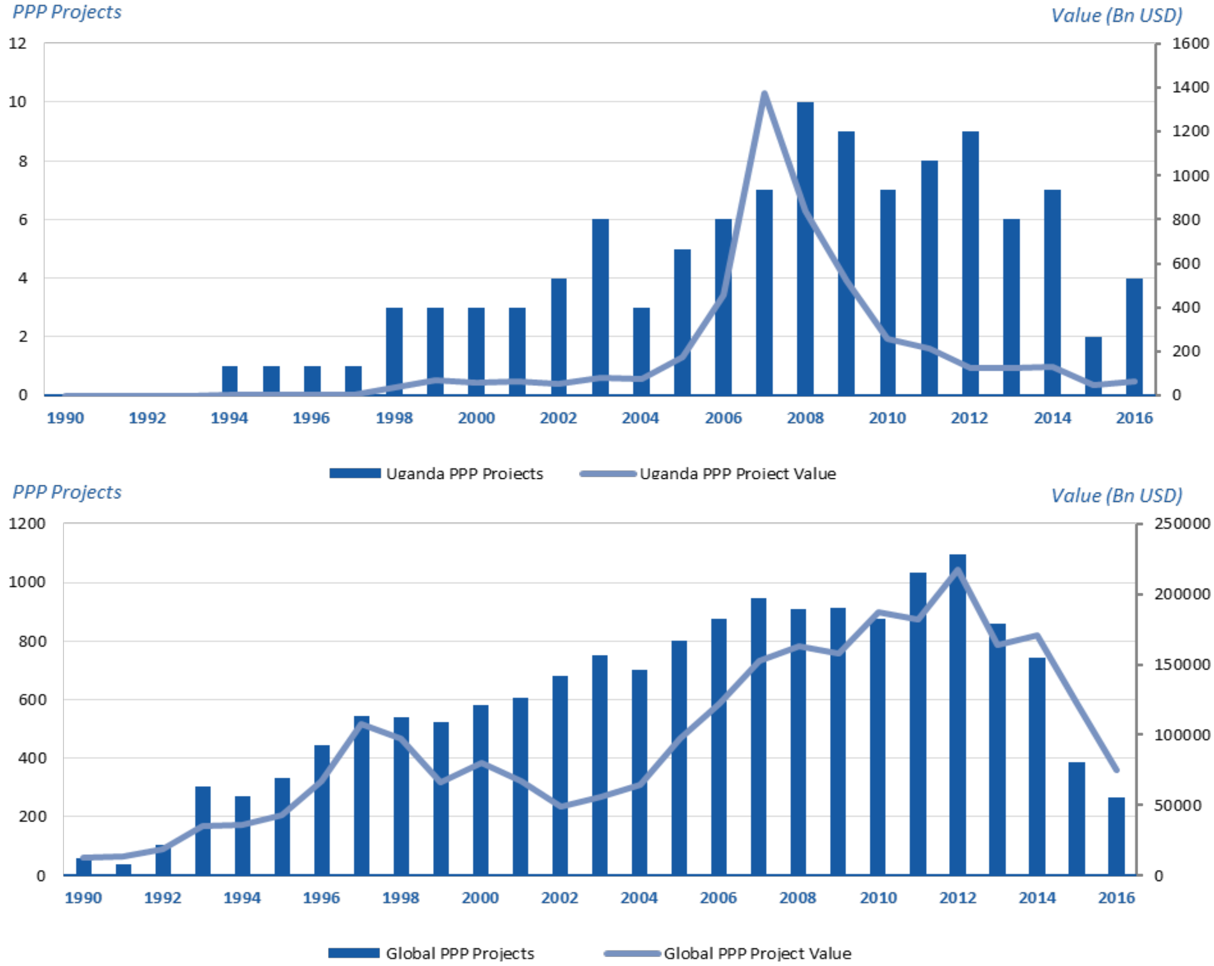


Figure 7.3 benchmarks Uganda's usage of PPPs against the global trend. The following observations can be made:

- Uganda started employing PPPs in 1994
- Uganda's total PPP project count between 1994 and 2016 amounts to 109 in Figure 7.3. The discrepancy results from projects that are counted multiple times due to expansions.
- The number of PPP projects implemented each year increased substantially between 1994 and 2008; however, the implementation of new PPP projects has slowed down from 2009 onwards, possibly due to adverse effects from the global financial crisis. A similar trend can be observed on a global scale, with a slowdown from 2013 onwards.

Figure 7.3 Uganda and Global PPP Application and Value



7.3.2 Water Transport PPPs

Currently, there are two ongoing water transport PPPs in Uganda:

- National Oil Distributors – National Oil Distributors operates a government-owned ferry, the MV Kalangala, between Nakiwogo (Entebbe) and Lutoboka (Kalangala island).
- Eleqtra / Kalangala Infrastructure Services (KIS) – Eleqtra / KIS operates two ferries, the MV Ssese and the MV Pearl, between Bukakata (mainland Uganda) and Luku (Kalangala island).

The table below summarises the water transport PPPs. Subsequently, relevant characteristics of the PPP agreements are detailed.

Table 7-2 Uganda Lake Transport PPP Projects

PPP	Service	Vessels	PPP Contract
MV Kalangala	Nakiwogo (Entebbe) – Lutoboka (Bugala island, Kalangala)	1	1-Year renewable management contract
Eleqtra / KIS	Bukakata (Masaka) – Luku (Bugala island, Kalangala)	2	15-Year Design, Build, Finance, Maintain, Operate, Transfer (DBFMOT) / Build Operate Transfer (BOT)

7.3.2.1 MV Kalangala

The MV Kalangala project comprises the operation of the MV Kalangala ferry. The table below provides an overview of key factors arranged in the contract. From the contract clauses, the following key observations are made:

- **Lacking Performance Monitoring and Compliance Measures** – While early termination due to performance failure is possible through clause 15, required service levels are not defined clearly. At a high level, tasks are allocated to the private operator and the public party. However, contracts for such ferry services are typically more detailed, identifying specific performance indicators and consequences of failing to comply with the prescribed indicators. For example, a contract may specify that the ferry is considered "late" if it leaves /arrives at a certain landing site more than 15 minutes behind schedule. Subsequently, the contract may prescribe a fine to be paid by the operator if, in a given month, the times the ferry service runs late exceeds a specified amount. Finally, persistent failure may result in termination of the contract.
- **Contract Termination at the Discretion of the Public Party** – Subsection 15f of the contract provides the GoU with the freedom to terminate the MV Kalangala contract at its discretion (without demonstrable failure on the part of the operator). This partially counteracts the risks resulting from the lack of an adequate monitoring and compliance system.
- **Conflicting Allocation of Responsibilities** – Sections 9.1 and 9.2 of the MV Kalangala operations ToR (included in the MV Kalangala contract) outlines the allocation of responsibilities between the public party and the private party. However, this allocation of responsibilities seems to be conflicting with the scope of services in section 4.5 of the MV Kalangala operations ToR, which also outlines the responsibilities of the private party. The seemingly conflicting responsibilities are further detailed in the table below.

Table 7-3 MV Kalangala Contract Overview

Contract Topic	Contractual Agreement / Observations
Type of Contract	Management Contract
Payments	Payments are based on a Lump Sum contract. The payments consist of a management fee and reimbursables towards actual deliveries made, as arranged in section 10 of the MV Kalangala operations ToR.
Duration	1-Year (Renewable)
Early Termination	Despite the short term of the contract, section 15 of the contract provides an opportunity for early termination of the contract, in case: • the Provider (private party) fails to remedy a performance / obligation failure within 30 days of receiving a notice of suspension of assignment; • the Provider becomes insolvent or bankrupt; • the Provider fails to comply with a final arbitration ruling; • the Provider submits a false statement that may substantially affect the rights and obligations of the Procuring and Disposing Entity (public party); • the Provider is unable to perform its activities for a period longer than sixty days, as a result of Force Majeure;

Contract Topic	Contractual Agreement / Observations
	• the Procuring and Disposing Entity, in its sole discretion and for any reason whatsoever, decides to terminate the contract; or • the Provider has engaged in corrupt or fraudulent practices in competing for or exercising the contract. It can be observed that the second last sub-clause provides the GoU with substantial freedom, as it enables the GoU to terminate the contract at its discretion (without demonstrable failure of the service provider). However, if the public party wishes to terminate the contract at its discretion, a 60-day termination period is to be taken into account, whereas contract termination through any of the other sub-clauses can be completed with a 30-day termination period.
Cessation of Services	If the contract is terminated or if the contract term is completed, all rights and obligations of parties cease, except for rights and obligations that have accrued up to the point of contract termination/completion. This entails that, in the case that the GoU terminates the contract through section 15 of the contract, the GoU is not required to compensate the operator for any loss of revenues, other than revenues that have accrued up to the date of termination. Furthermore, there is no transfer of assets, as the ownership of the MV Kalangala already lies with the GoU.
Responsibilities	<u>Responsibilities Client (Section 9.1 of MV Kalangala Operations ToR)</u> • Selection contract manager and/or project management team • Crew recruitment, deployment, supervision and remuneration • Determination of fares • Establish contacts with relevant stakeholders • Liaise and assist to obtain any other information and documents required from other Government of Uganda agencies and which the client considers essential for the proper conduct of the assignment • Provide necessary assistance in the clearing of imported equipment and any software meant for this assignment • Embossing tickets • Reviewing the performance of the operator • Construction and maintenance of landing facilities • Voyage scheduling • Docking • Insurance for the ship • Class surveys and licensing • Assistance to obtain visas and work permits for foreign staff of the consultant • Corrective maintenance <u>Responsibilities Operator (Section 9.2 of MV Kalangala Operations ToR)</u> • Office and residential accommodation • Computer hardware, software, communication, office supplies etc • All necessary vehicular and boat transport • Collect and bank revenues on the client's account • Manage the canteen services and raise a monthly fee payable to the client's account • All other support facilities It seems that the allocation of services, as outlined above, conflicts with section 4.5 of the MV Kalangala Operations ToR, which states that voyage scheduling, passenger tickets, and corrective maintenance fall under the responsibilities of the operator.
Market Risk	The majority of market risk related to passenger volumes is allocated to the GoU; ticketing revenues are directly submitted to the GoU, whereas the operator is reimbursed based on a Lump Sum contract. However, pursuant to section 4.6.16 of the MV Kalangala ToR, the operator is required to meet a minimum monthly passenger revenue of UGX 60M, thus limiting the market risk of the GoU. Additionally, the operator bears some market risk through canteen operations, as the operator is obliged to pay a fixed fee per month to the GoU, irrespective of the canteen revenues generated during the period.
Technical Risk	In contrast to market risk, the operator seems to bear most of the technical risk, as a substantial portion of payments from the GoU to the operator is based on actual deliveries / service levels.
Investments	No substantial investments are allocated to the operator; the GoU owns the MV Kalangala vessel and the landing sites. However, maintenance activities are to be carried out by the operator, pursuant to sections 4.6.8 and 4.6.11 of the ToR.

7.3.2.2 Kalangala Infrastructure Services

The Kalangala Infrastructure Services project comprises multiple components, including a power generation component, a water provision component, a road development component, and a ferry component. This assessment will focus on the ferry component. The table below provides an overview of key factors arranged in the contract. From the contract clauses, the following key observations are made:

- **Lacking Performance Monitoring and Compliance Measures** – Section 15 of the contract allows for early termination of the contract due to a material breach of the contract. While not explicitly stated, it is assumed that lasting failure to adhere to service levels would constitute a breach of the contract. However, similar to the MV Kalangala contract, required service levels are not defined clearly. Some ferry service monitoring arrangements are made in Schedule 4, part 1, section 1.3. However, this section only covers the tools that are to be implemented for monitoring purposes; no specific service levels are defined.
- **Unclear Payment Streams** – From consultations, MTBS understands that the operator receives availability payments, based on actual sailings realised. The number of sailings to be realised each year is decided on by the GoU at the start of the year. These availability payments are necessary to reimburse the operator for its investments and operating expenses, as it cannot recover its costs due to a decision to provide the passenger services free of charge; as such, these availability payments are (partially) a form of subsidising. However, it is understood that the ferry service is not free of charge for vehicles. From the Implementation Agreement, it is unclear which party receives the revenues from the vehicle ferry tickets that are sold. Additionally, the frequency, timing, and exact amount of the availability payments to the operator are not clearly outlined in the Implementation Agreement.
- **Unclear Allocation of Responsibilities** – Form the Implementation Agreement, it is unclear which party is responsible for services such as ticket embossing, ticket sales, promoting the services, scheduling etc.

Table 7-4 Kalangala Infrastructure Services Contract Overview

Contract Topic	Contractual Agreement / Observations
Type of Contract	As (i) the operator is responsible for financing and developing the landing sites and ferry fleet, (ii) the assets are transferred after contract expiry/termination, and (iii) the operator is reimbursed based on availability of the ferry services, the project structure resembles a DBFMOT. This is a much more complex and comprehensive PPP structure than the management contract that was employed for the MV Kalangala project.
Payments	Payments to Operator Besides the main Implementation Agreement, a right to use agreement for the ferry landing sites has been prepared to support and further detail the contractual agreements. Pursuant to section 6.1 of this agreement, the operator has the right to charge users of the ferry landing sites it operates. Additionally, the main Implementation Agreement outlines compensation/transfer payments in case of early termination by either party. Furthermore, the Implementation Agreement allows for subsidies from the GoU, in order to lower the ticket prices for passengers. Such a subsidy has been agreed on during a meeting on the 5th of January 2011. At that time, it was agreed that the GoU would pay an annual subsidy of UGX 1 B to reduce the ticket prices from UGX 3,500 to UGX 1,664. It is noted that the service is currently free of charge; as such, it is assumed that a further subsidy was agreed upon during a later meeting. However, payments from vehicle ticketing revenues (vehicles are charged) or availability payments are not clearly detailed in the Implementation Agreement or right to use agreement. It is understood that the operator receives annual availability payments based on the actual number of sailings realised. Payments from Operator Pursuant to section 6 of the contract, the operator is required to pay for: • GoU costs related to activities of the oversight committee; • travel costs incurred by the GoU to attend meetings of contractors or financing parties; and • expenses for on-site customs clearance officers.
Duration	The full project, including the ferry component, has a basic operational period of 15 years. The contract automatically ends when the operational period is completed.

Contract Topic	Contractual Agreement / Observations
Early Termination	There are several options for early termination of the contract. Pursuant to section 15.3 of the contract, the GoU may opt for early termination of the contract if the operator has an event of default. An operator event of default is defined in section 15.1 as: • Failing to make a payment required to be made by the operator as per the contract; • A material breach of the contract by the operator; or • Any misleading or untrue representation or warranty by the operator that adversely and materially affects the GoU. Conversely, the operator can opt for early termination in case of lasting force majeure or an event of default on the part of the GoU. The definition of force majeure is provided in section 14.1 of the contract; the definition of a GoU event of default is presented in section 15.2 of the contract.
Cessation of Services	Transfer Options At early termination of the contract, the operators' facilities and interest in sites may be transferred, pursuant to section 16.1 of the contract. It is assumed that the ferry vessels are also included in the term "facilities and sites". Section 16.1a arranges the transfer option of the GoU in case of an operator event of default. In this case, the GoU has the right (but is not obliged) to require the operator to sell all of its interests to the GoU. However, the GoU does not have the right to only require the operator to sell a selection of its interests. Conversely, the transfer options of the operator, in case the operator opts for early termination (pursuant to sections 14.6 and 15.3), are arranged in sections 16.1b through 16.1d. Transfer Process Pursuant to section 16.3a, the party that has the right to trigger a transfer of assets can do so by giving a transfer notice to the other party within 60 days of the contract termination. If such a notice is not given within 60 days, it is assumed that the party that has the right to trigger a transfer of assets waives this right. Pursuant to section 15.5 of the contract, the GoU shall not take possession of the facilities or sites before the full applicable compensation has been paid to the operator in case of an early termination. The transfer process is further detailed in schedule 5 of the contract. Transfer Compensation Pursuant to section 16.2a, the compensation amount of an early termination is arranged in schedule 5 of the contract.
Responsibilities	Landing Site Repair and Maintenance Pursuant to section 5.1 of the ferry landing site right to use agreement, the operator is responsible for carrying out small maintenance and repair works that result from wear and tear from the ferry operations. However, pursuant to section 5.2 of the right to use agreement, UNRA remains responsible for dredging and carrying out structural maintenance and repair works. Ferry Operations From the Implementation Agreement, it is unclear who is responsible for ticket embossing, ticketing, scheduling etc.
Market Risk	All of the market risk is allocated to the GoU, as it is understood that the operator receives fixed availability payments based on sailing of the operated ferries. Hence, the payments are irrespective of the number of passengers carried.
Technical Risk	Technical risk is allocated to the operator, as the operator receives reduced or no availability payments if the ferry services are not provided due to technical issues.
Investments	Pursuant to the contractual arrangements, the operator is responsible for investing in procuring the ferry vessel(s), improving the landing sites, and developing road infrastructure on Bugala island. It is noted that, to the knowledge of the MoWT, the operator has not made investments in the landing sites and road infrastructure.
Monitoring	Monitoring and verification measures are arranged in Schedule 4, part 1, section 1.3 of the contract. Pursuant to section 1.3a of Schedule 4 part 1, the operator is obliged to have a monitoring system in place, in order to enable the GoU to monitor performance. Additionally, pursuant to section 1.3b and c of Schedule 4 part 1, the operator is obliged to appoint one or more independent experts that monitor the levels of passengers.
Licencing	In order to mitigate risks related to annual licencing requirements (pursuant to section 9 of the Inland Water Transport Control Act), the PPP agreement includes a guarantee that the operator will be able to obtain the licence as long as the operator complies with the licencing requirements. This guarantee is arranged in section 7.3 of the contract.

7.4 Key Legal and Contractual Issues and Mitigation Measures

The table below summarises the key legal and institutional issues that have been identified, and offers mitigation measures for each of the issues.

Table 7-5 Key Legal and Contractual Issues and Mitigation Measures

Issue	Mitigation Measure
There is currently no merchant shipping act in place to organise the port and shipping activities in Uganda.	The 2017 Inland Water Transport Bill is currently being drafted. This piece of legislation will act as Uganda's equivalent of a Merchant Shipping Act.
Annual shipping licence renewal requirements may pose a threat to private ferry operators, as a cancellation of such a licence may prohibit the operators from carrying out their ferry activities, despite a potential long-term PPP agreement being in place.	The MoWT should absorb this risk, as it can control the relevant licencing authority (Transport Licencing Board). The PPP agreement between the GoU and KIS already includes such a measure, as it stipulates that KIS is ensured to obtain its annual licence, as long as it complies with the necessary conditions outlined in the Inland Water Transport Control Act.
it is unclear whether the envisioned passenger transport landing site developments can be implemented under the current BMU structure	It should be assessed whether the Fish (Beach Management) Rules allow for envisioned landing site developments, or that additional steps are required to enable such developments.
Potential issues with non-compliance of private parties with requirements set forth in a PPP agreement.	The PPP agreement should clearly identify breaches of the PPP agreement and resulting consequences, such as penalties or early termination of the PPP agreement. In section 7.5, examples of such breaches and penalties are provided for each of the 3 Influence Areas.

7.5 PPP Performance Monitoring

In this section, Key Performance Indicators (KPIs) are identified for each of the 3 influence areas, in order to enable efficient monitoring of the private operators.

7.5.1 Point to Point Cargo Services Across the Lake ("Influence Area A")

In the area of cargo shipping services, PPP structures are less common than in the area of ferry services and port operations. However, the following KPIs can be employed in PPP agreements.

Table 7-6 PPP Performance Monitoring - Influence Area A

KPI
Timely delivery of vessels
Percentage of cancelled services per month
Percentage of cancelled services per year
Non-operational (layup) time per year
Ports that are required to be called by the shipping services
Violation of safety and health regulations
Violation of security regulations
Violation environmental regulations

7.5.2 Lake Victoria Passenger Ferry Services ("Influence Area B")

The table below presents several examples of specific KPIs and penalty clauses that can be implemented in a ferry operator contract. Larger breaches, such as default of the operator, are omitted, as these breaches are already adequately addressed in current ferry PPP agreements in Uganda.

Table 7-7 PPP Performance Monitoring - Influence Area B

KPI	Threshold	Penalty
Percentage of monthly arrivals more than 15 minutes later than scheduled	3.0%	USD 500 per 1% of late arrivals (> 3.0%)
Number of premature departures from a landing site per month	0	USD 500 per premature departure
Percentage of cancelled services per month	2.0%	USD 2,500 per 1% of cancelled services (> 2.0%)
Percentage of cancelled services per year	0.2%	USD 5,000 per 0.1% of cancelled services (> 0.2%)

7.5.3 Port Bell and Jinja Port Operations under a Landlord Structure ("Influence Area C")

The table below provides several examples of specific KPIs that can be implemented in a cargo port PPP agreement.

Table 7-8 PPP Performance Monitoring - Influence Area C

KPI
Average vessel waiting time
Average truck waiting time
Average loading / offloading time
Average revenues / OPEX per ton handled
Amount of cargo (tons) handled*
Average cargo dwell time*
Violation of safety and health regulations
Violation of security regulations

KPI
Violation environmental regulations
Adequate and properly maintained equipment to be available
Skilled & sufficient labour per shift worked

*It is noted that cargo dwell time will not likely be an issue in a port that focuses on RoRo vessels, as the trucks on the vessels often directly take their cargo load out of the port.

**In seaports, the Global Terminal Operators that carry out the operations are often (partially) aligned with shipping lines, enabling them to attract cargo streams. This limits the market risk for a terminal operator resulting from a volume guarantee. In contrast, the smaller parties that will likely be interested in carrying out operations at the lake ports will not likely be able to generate substantial cargo streams independently. As such, these parties will not likely agree to substantial volume guarantees.

PART B: BUSINESS CASE

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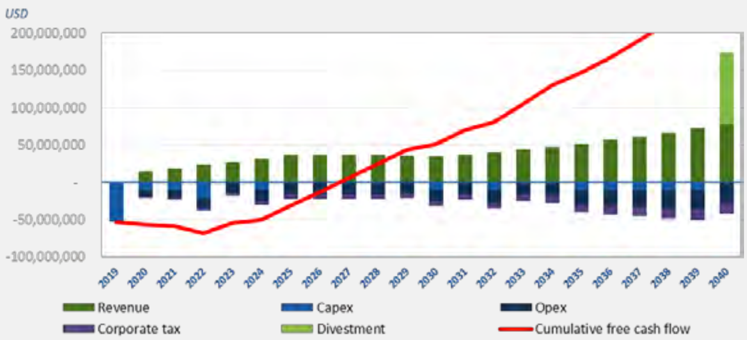
8 Project Business Case

Summary
This chapter highlights the results from the financial model and the project business cases for the three projects. The results of the Project Business Case for the three projects are presented below.

Project Area A - Freight vessel operations

	Project	Port Bell		Jinja Pier	
		Mwanxa	Kisumu	Mwanxa	Kisumu
Project NPV FCF (USD)	15,335,623	12,370,744	2,661,722	10,814,928	(10,511,771)
Project IRR (%)	16.2%	23.1%	14.5%	23.5%	-9.5%
Payback year	2027	2027	2027	2026	0
Funding requirement (USD)	67,806,394	14,130,719	34,075,301	13,199,817	20,138,434



Project Area B - Ferry services

	Project	Lot 1	Lot 2	Lot 3	Lot 4	Lot 5	Lot 6
Project NPV FCF (USD)	0	0	0	0	0	0	0
Project IRR	13.00%	13.00%	13.00%	13.00%	13.00%	13.00%	13.00%
Payback period	2028	2028	2027	2028	2028	2027	2028
Funding requirement (USD)	83,115,875	12,993,125	14,976,000	12,993,125	14,976,000	14,976,000	10,218,750

Project Area C - Port Bell & Jinja Pier Operations

	Combined project	Port Bell	Jinja Pier
Project NPV FCF (USD)	11,539,308	11,480,290	59,017
Project IRR	27.18%	40.92%	13.14%
Payback year	2024	2023	4060
Funding requirement (USD)	12,374,000	6,187,000	6,187,000

8.1 Introduction

This chapter highlights the results from the financial model and the project business cases for the three projects. Main input for this chapter are the cost estimates presented in chapter 4, and the tariff assessment presented in chapter 5. This chapter consists of the general assumptions which hold for all three projects, and for each particular project, we present the:

- Revenue analysis;
- Capex analysis;
- Opex analysis;
- Financial viability analysis; and
- Sensitivity analysis.

The project areas are subdivided in different lots, as it is likely that private sector participation will be implemented through (up to) multiple lots: the investment costs would be too high for one concessionaire. This will be most relevant in chapter 9: PPP structures, but by making the subdivision already in this chapter, the differences in financial performance in the different lots can be identified.

Project area A - Freight vessel operations is subdivided in one lot per route, hence four lots. Project area B - Ferry services is subdivided in six lots, combining ferry routes based on geography. Project area C - Port operations is subdivided in Port Bell and Jinja Pier.

8.2 General assumptions

Table 8.1 mentions the general assumptions as applied in the financial model and business cases for the three projects.

Table 8-1 General assumptions

Model assumption		Comment
Preparatory period	2017 - 2019	The purpose of the preparatory period is to finalise studies, PPP procurement, procurement of vessels and port and landing site construction.
Concession period	2020 - 2040	
Model Currency	USD	
Exchange rate UGX - USD	3,597	Source: Worldbank
Inflation rate	none	The proceeds and costs of the project business case are expressed in real terms.
Depreciation	Linear	
Corporate tax	30%	The corporate tax rate is 30%, with the exception of resident companies whose turnover does not exceed UGX 150 million. (Source: PwC)
Divestment	yes	The remaining value at the end of the concession period is added to the free cash flow at the end of the concession period. The assumption is made that at the end of this concession period, the concessions will be renewed.
Project WACC	12%	Based on the consultant's experience in the region, see calculation below

Table 8-2 presents the calculation of the Weighted Average Cost of Capital (WACC) as applied in the financial model and the project business case for the discount of the cash flows.

Table 8-2 Calculation of Project WACC

Model assumption		Comment
Rf	2.0%	Risk-free rate: 10y bond for US as proxy: 1.6%, rounded up to 2.0% (Source: Investing.com)
Rm	15.5%	Market risk premium: NYU Stern data for Kenya as proxy (12.7%) plus extra risk for Uganda
Equity / Total liabilities	40%	Project target
Debt / Total liabilities	60%	Project target
Marginal tax rate (tC)	30%	Corporate tax rate
βu	0.83	Unlevered Beta (Source: NYU Stern, average of Transport & shipping)
βl	1.70	Levered Beta = βU*(1+(1-τ)*(D/E))
Re,l	25.8%	Leveraged cost of equity: βL * RM + RF + Liq premium
Rd	4%	RF + 6% margin; for DFI loan portion only 4%
WACC	**13.0%**	**E/(tot liabilities) * RE,L + D/(total liabilities) * RD * (1-τC)**

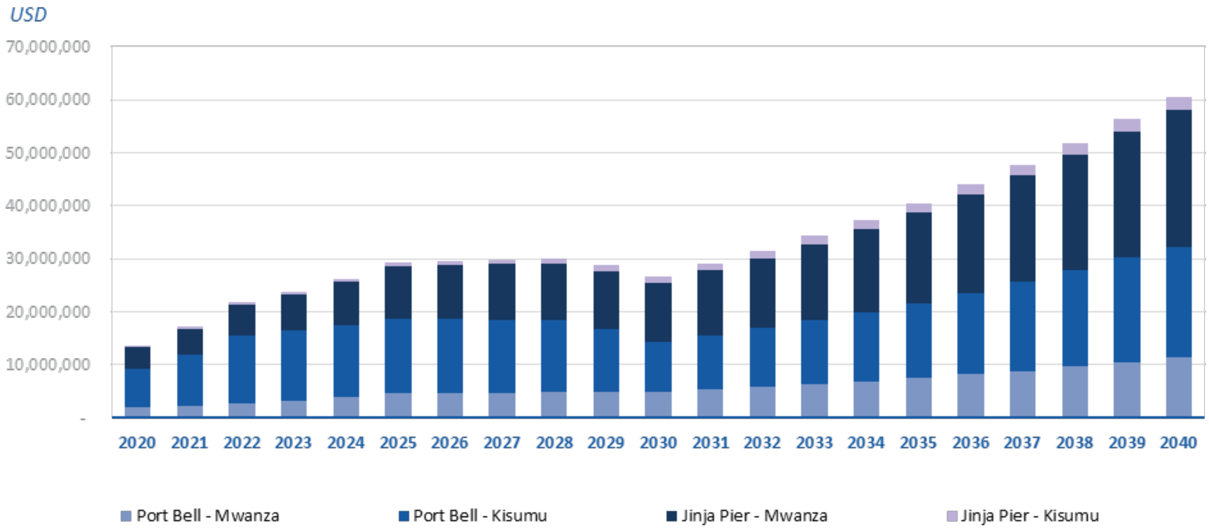
Typically, the private sector has lower financing costs, however, we don't assume a financing cost advantage in the case of Uganda due to its unfavourable credit rating (Source: S&P, Moody's).

8.3 Area A - Freight vessel operations

8.3.1 Revenue analysis

The following figure presents the revenues from freight vessel operations on the routes from Port Bell and Jinja Pier to Mwanza and Kisumu and vice versa. As mentioned in the traffic projections, the Port Bell to Kisumu traffic shows a dip in the period 2028 to 2035. This implies that three newly acquired vessels to accommodate the increased demand from 2025 to 2028 become obsolete in the 5 years thereafter. Therefore, the traffic is capped at 700,000 tons up to 2028. Port Bell to Kisumu is the most important route early in the concession, while the Jinja Pier to Mwanza route is estimated to attract the largest volumes in the more distant future.

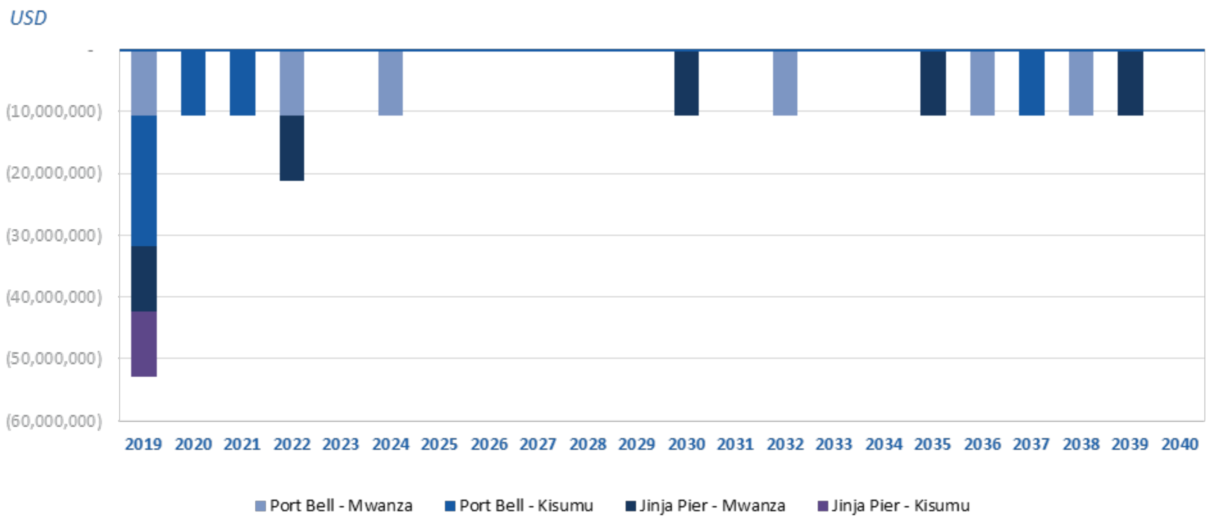
Figure 8.1 Revenue of freight vessel operations on the Port Bell and Jinja Pier routes to Mwanza and Kisumu



8.3.2 Capex analysis

The following figure presents the capex of the freight vessel operations for the four Port Bell and Jinja Pier services. One year prior to commencement of operations, five vessels are procured (3 for Port Bell / 2 for Jinja Pier), and the fleet is expanded along with the development of traffic on the four routes. Demand projections keep increasing in the last five years of the concession period. In the financial model, it is assumed that the remaining value of the assets flows back into the project. This is justifiable as it is likely that the concession will be renewed, or a new concession will be established.

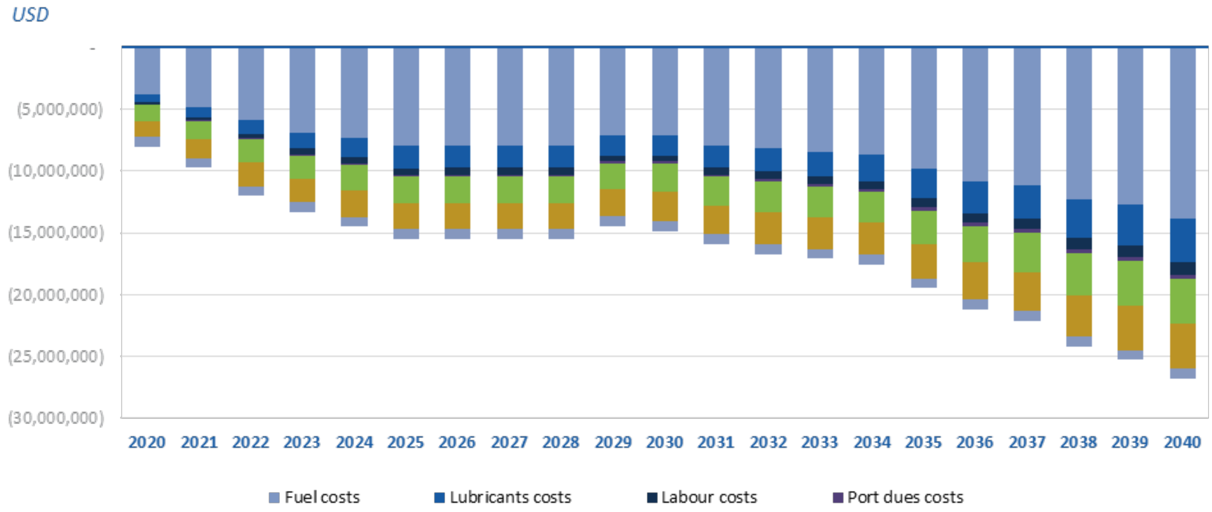
Figure 8.2 Capex of freight vessel operations for the Port Bell and Mwanza services



8.3.3 Opex analysis

The following figure presents the opex of the freight vessel operations for the four Port Bell and Jinja Pier services combined. Fuel and lubricants are the main drivers of the operational costs. The operational costs increase over time due to the increase in number of roundtrips.

Figure 8.3 Opex of freight vessel operations for the Port Bell and Mwanza services



8.3.4 Financial viability

Combining the previous sections, and the corporate tax, we provide an overview of the financial indicators and annual project cash flows for the freight vessel operations. The cash flows include the revenues, opex, capex, tax and divestment. For sake of comparison, we also present the individual free cash flows of the freight vessel operations for the Port Bell and Jinja Pier services.

The main conclusions for the financial viability of Project Area A - Freight vessel operations are:

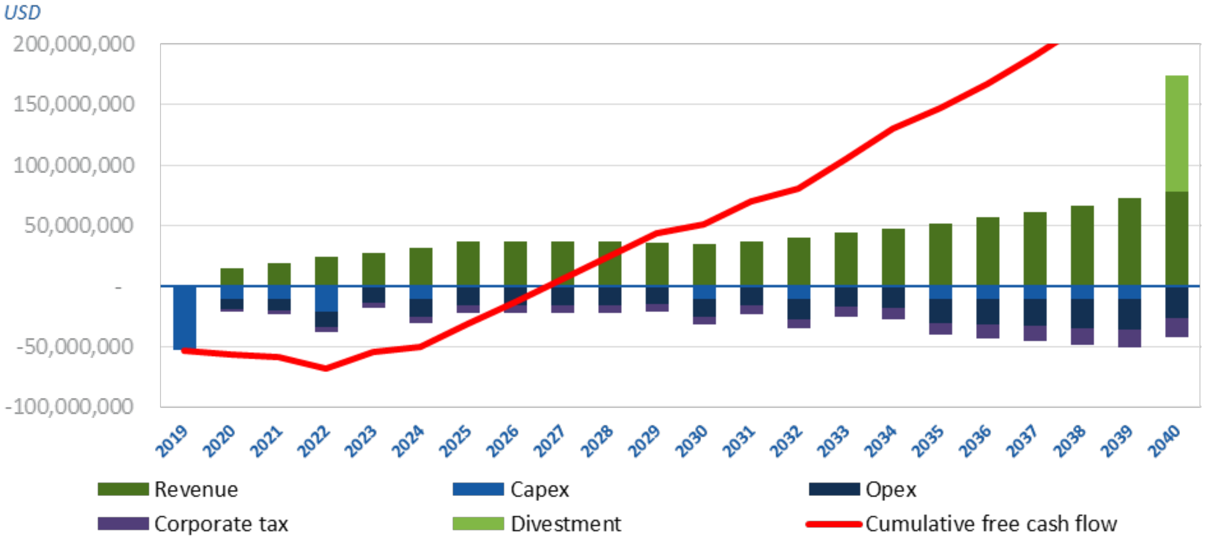
- Overall, the project business case for Project Area A is financially feasible, with an NPV of 15.3 M USD.;
- The results of the project business case is driven by the routes of Port Bell and Jinja Pier to Mwanza; and
- The route Jinja Pier to Kisumu is financially not feasible, negatively impacting the project business case.

Table 8-3 Financial indicators of the freight vessel

	Project	Port Bell		Jinja Pier	
		Mwanxa	Kisumu	Mwanxa	Kisumu
Project NPV FCF (USD)	15,335,623	12,370,744	2,661,722	10,814,928	(10,511,771)
Project IRR (%)	16.2%	23.1%	14.5%	23.5%	-9.5%
Payback year	2027	2027	2027	2026	0
Funding requirement (USD)	67,806,394	14,130,719	34,075,301	13,199,817	20,138,434

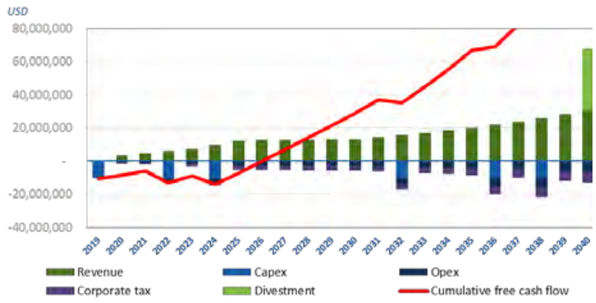
The following figure presents the free cashflow for the freight vessel operations for the Port Bell services and Jinja Pier services combined.

Figure 8.4 Free cashflow for the freight vessel operations for the Port Bell and Jinja Pier services combined

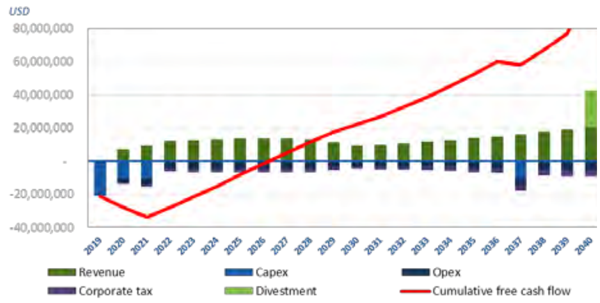


The following figures presents the free cashflows for each of the four routes. The purpose of the figures is to present an overview of the (cumulative) cash flows of each route. The figures show that only the Jinja Pier to Kisumu route is not financially feasible due to the low projected traffic.

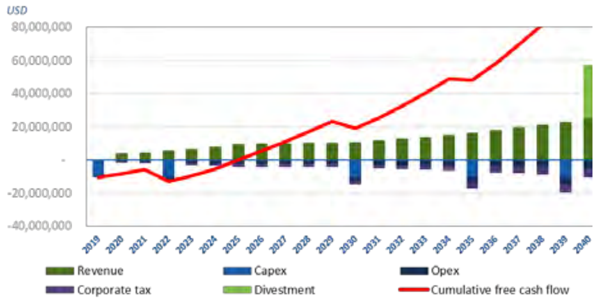
Port Bell to Mwanza



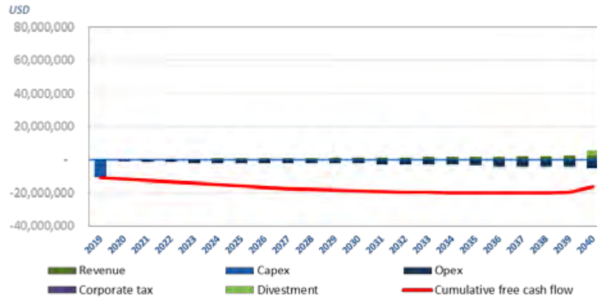
Port Bell to Kisumu



Jinja Pier to Mwanza



Jinja Pier to Kisumu



8.4 Area B - Ferry services

This section presents the financial viability of Project Area B - Ferry services at the project level. As such, the cash flows and the financial indicators of the ferry services are not yet allocated to the government or the private operator. However, as the ferry services are subdivided into six individual lots, the financial assessment is carried out at the lot level. This enables the identification of differences in projected performance for particular segments of the project. The differences in financial performance are driven by differences in traffic (revenues) and differences in distances of the respective routes (opex). As mentioned in the introduction of this chapter, project Area B - ferry services is divided in six lots, based on geographical location. The lots are presented in the following table.

Table 8-4 Definition of regions for the ferry services

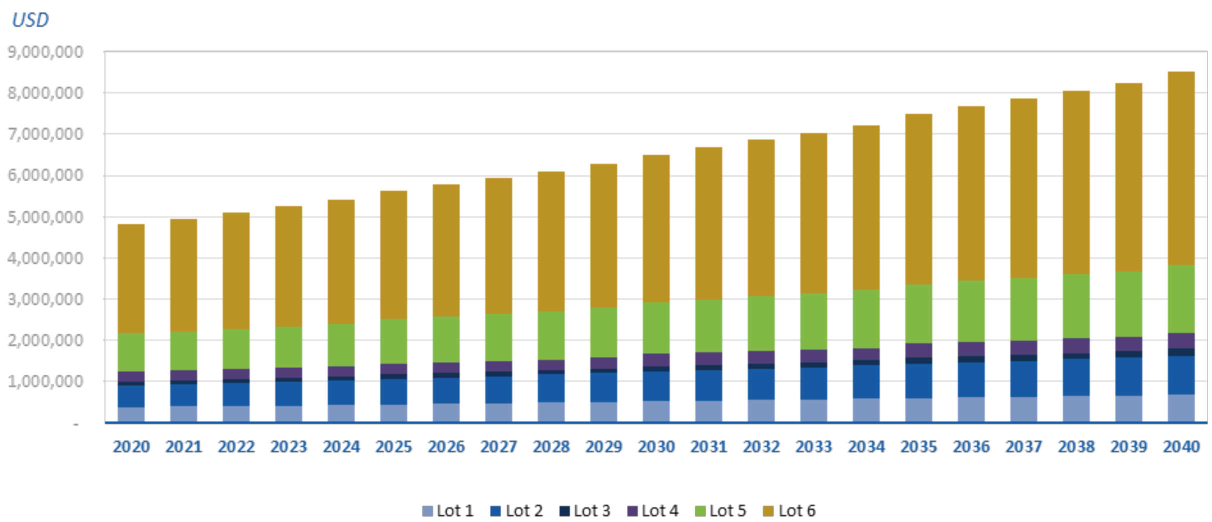
Lot 1	Lot 2	Lot 3	Lot 4	Lot 5	Lot 6
Kyanvubu to Nakiwogo	Damba island to Port Bell and Katosi	Buvuma to Kiyindi	Ssenyi to Buziri	Bwondha to Golofa and Matolo	Port Bell to Kigungu and Ggaba
Nakiwogo to Zingoola	Port Bell to Namisoke	Buwanzi to Masese and Namoni	Ssenyi to Lwaji Island		
		Bugaia to Lyabana			

8.4.1 Revenue analysis

The following figure presents the revenues from ferry services on the routes identified in chapter 4 and presented in the table above. The revenues, as presented in this graph, exclude subsidies. The revenues excluding subsidies provide insight into the financial implications of the ferry services as a standalone self-sustaining project. As mentioned in section 7.3, the demand projections show a gradual increase. This translates to a gradual increase in revenues for all routes.

As concluded from the tariff assessment, the tariff for passengers is set at 0.10 USD per km for the island to mainland services. In contrast, the tariff for Lot 6 – the mainland to mainland service – is set at a level that enables self-sufficiency of the service. This is due to the fact that this service, which connects Port Bell to the airport (Kigungu), serves a lesser social function, compared to the island to mainland ferry services. Specifically, the tariff for this service is set at 16 USD: this is the minimum rate for financial feasibility. The service has the potential to charge a higher rate, as it competes with taxis that use the congested road connection between Kampala and Entebbe airport.

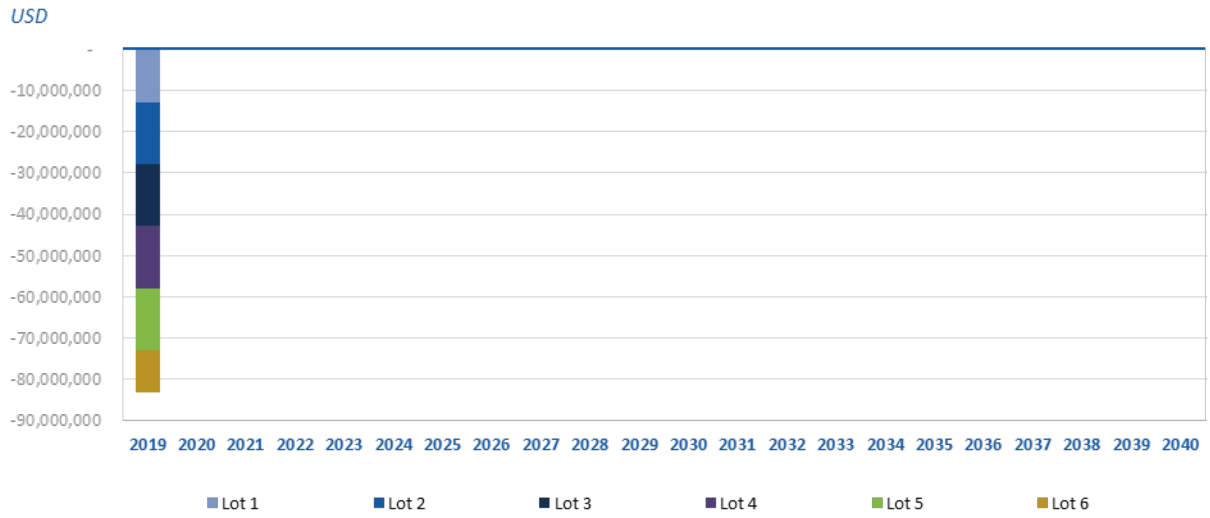
Figure 8.5 Revenue of ferry services divided by West and East



8.4.2 Capex analysis

The following figure presents the capex of the ferry services for the ferry vessels and rehabilitation of the Landing sites for the six lots respectively. The difference in capex per lot is caused by the number of required landing sites and the current state of the landing sites. For a more detailed breakdown of capex per landing site, see section 4.2. It is expected that the economic lifetime of the vessels is 30 years, exceeding the concession period; hence, no re-investment is required. One year prior to commencement of operations, the vessels nine vessels are procured. The depreciation period of the investments for the landing sites is assumed to be equal to the concession period. Maintenance to the vessels and the landing sites is included in the opex.

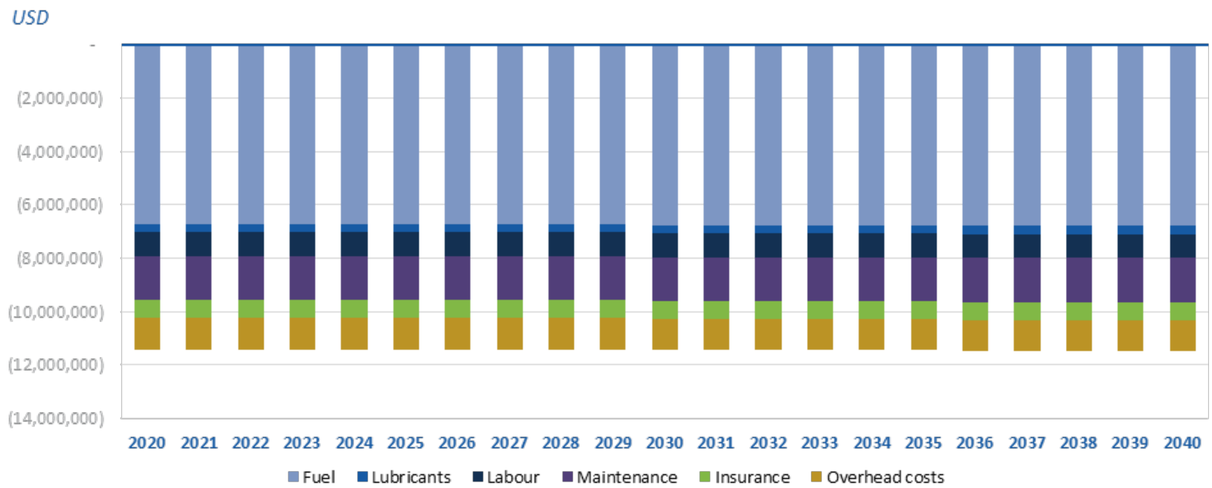
Figure 8.6 Capex of the ferry services for project lots



8.4.3 Opex analysis

The following figure presents the opex of the ferry services combined, categorised by the different opex categories. Fuel is the main driver of the operational costs. The operational costs remain relatively constant over time, as the number of roundtrips remain constant, with the exception of the Buwanzi / Masese / Namoni service, which will increase in number of roundtrips to facilitate the projected passenger volumes.

Figure 8.7 Opex of ferry services for project lots



8.4.4 Gap funding

Project Area B - Ferry services is not financially feasible as a project on itself (with the exception of Lot 6), as is the case with many ferry operations, such as the ferry services in The Netherlands, Belgium, Scotland and Greece. This is presented in the following table. Lot 6 is financially feasible, as it competes with the road connection from Kampala to Entebbe airport, and therefore allows for a higher tariff for the passengers.

Table 8-5 Financial indicators of Project Area B - Ferry Services without gap funding

	Project	Lot 1	Lot 2	Lot 3	Lot 4	Lot 5	Lot 6
Project NPV FCF (USD)	(83,792,586)	(16,936,405)	(15,662,908)	(19,835,412)	(18,276,848)	(13,081,013)	0
Project IRR	-15.31%	N/A	N/A	N/A	N/A	-8.56%	13.00%
Payback period	N/A	N/A	N/A	N/A	N/A	N/A	2028
Funding requirement (USD)	183,029,003	44,763,717	36,269,540	44,763,717	47,786,449	24,734,943	10,218,750

As such, Viability Gap Funding (VGF) is required. The aim of the gap funding is to generate an NPV of 0 USD at the Lot level for each Lot, and hence at the overall Project level. This implies a different gap funding for each particular Lot. The gap funding is structured by means of an availability payment per roundtrip. For the NPV of the Lots to be 0 USD, the financial model returns the following availability payments per roundtrip.

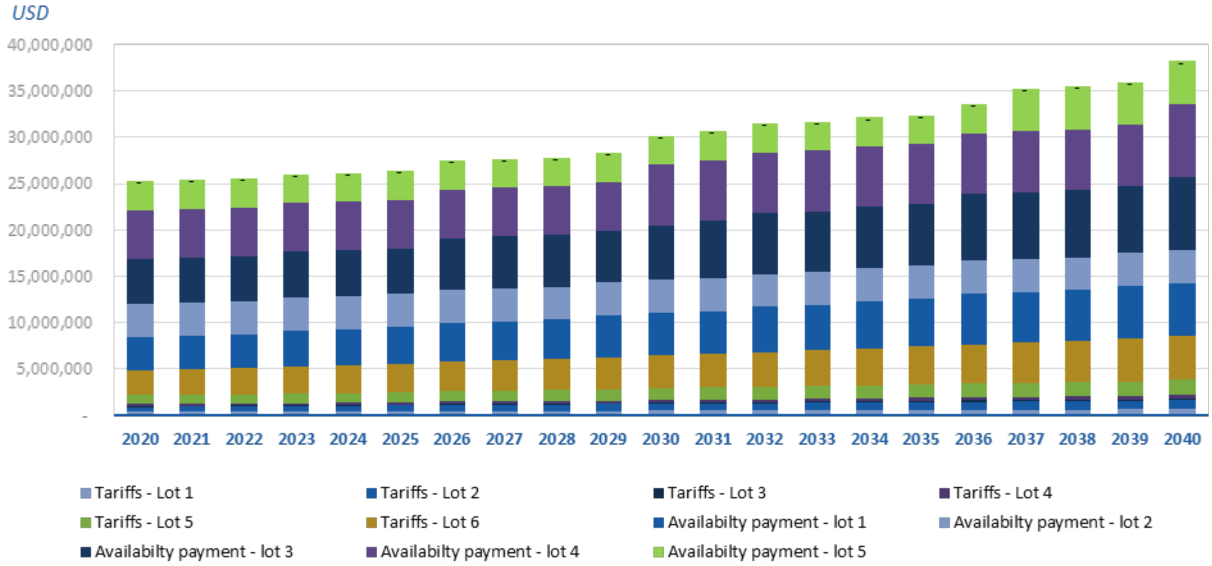
Table 8-6 Structure of gap funding for Project Area B - Ferry Services

	Lot 1	Lot 2	Lot 3	Lot 4	Lot 5	Lot 6
Availability payment per roundtrip (USD)	757	3,253	912	3,281	3,785	0
Average gap funding per annum (USD)	4,212,698	3,562,186	6,134,723	5,475,091	3,026,239	0

The remark is made that Lot 6 receives no availability payment by definition, as this mainland to mainland connection should be financially feasible without gap funding.

The revenues including the gap funding is presented in the following graph.

Figure 8.8 Revenues of the Ferry Services including gap funding



8.4.5 Financial viability

Combining the previous sections, and the corporate tax, we provide an overview of the financial indicators and annual project cash flows for the ferry vessel operations. The cash flows include the tariffs paid by passengers, gap funding, opex, capex, tax and divestment. For sake of comparison, we also present the financial indicators of the six lots respectively.

Table 8-7 Financial indicators of the ferry services

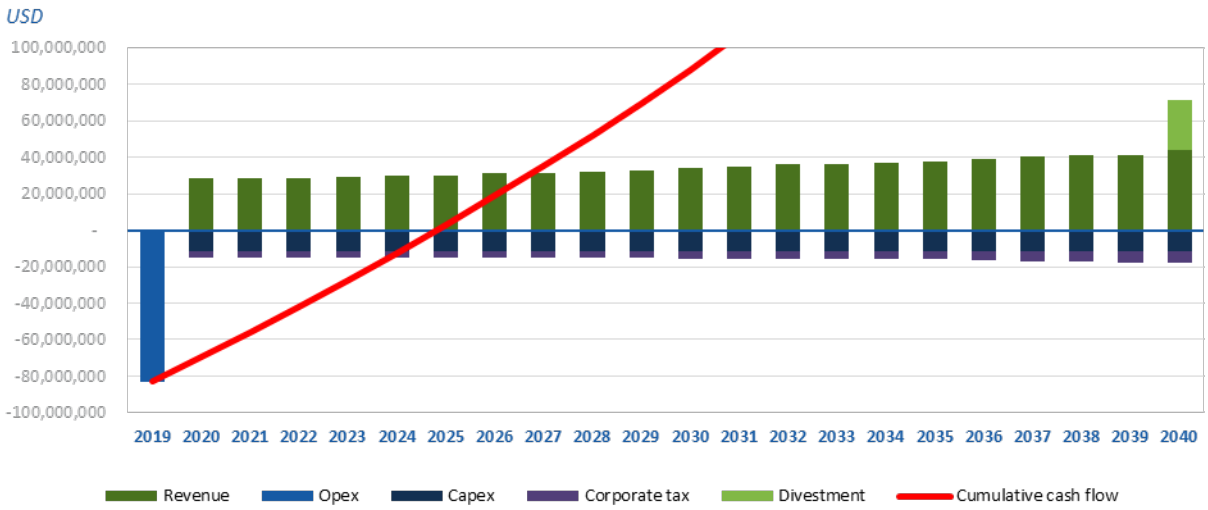
	Project	Lot 1	Lot 2	Lot 3	Lot 4	Lot 5	Lot 6
Project NPV FCF (USD)	0	0	0	0	0	0	0
Project IRR	13.00%	13.00%	13.00%	13.00%	13.00%	13.00%	13.00%
Payback period	2028	2028	2027	2028	2028	2027	2028
Funding requirement (USD)	83,115,875	12,993,125	14,976,000	12,993,125	14,976,000	14,976,000	10,218,750

The main conclusions for the financial viability of Project Area B - ferry services are:

- The project business case for Project Area B is only financially feasible with gap funding;
- The purpose of the gap funding is to enable passengers from the islands in Lake Victoria to travel in a safe and reliable manner for a reasonable tariff of 0.10 USD per kilometre; and
- Lot 6, the mainland to mainland connection from Port Bell via Ggaba to Kigungu (Entebbe airport) is financially feasible with a tariff of 16 USD, and offers an alternative to taxis via the road connection.

The following figure presents the free cashflow for the ferry services for the six lots combined.

Figure 8.9 Free cashflow for the ferry services for the six Lots combined



The following figures presents the cashflows for each of the six Lots. The purpose of the figures is to present an overview of the annual and cumulative cash flows of each Lot.

Lot 1

Lot 2

Lot 3

Lot 4

Lot 5

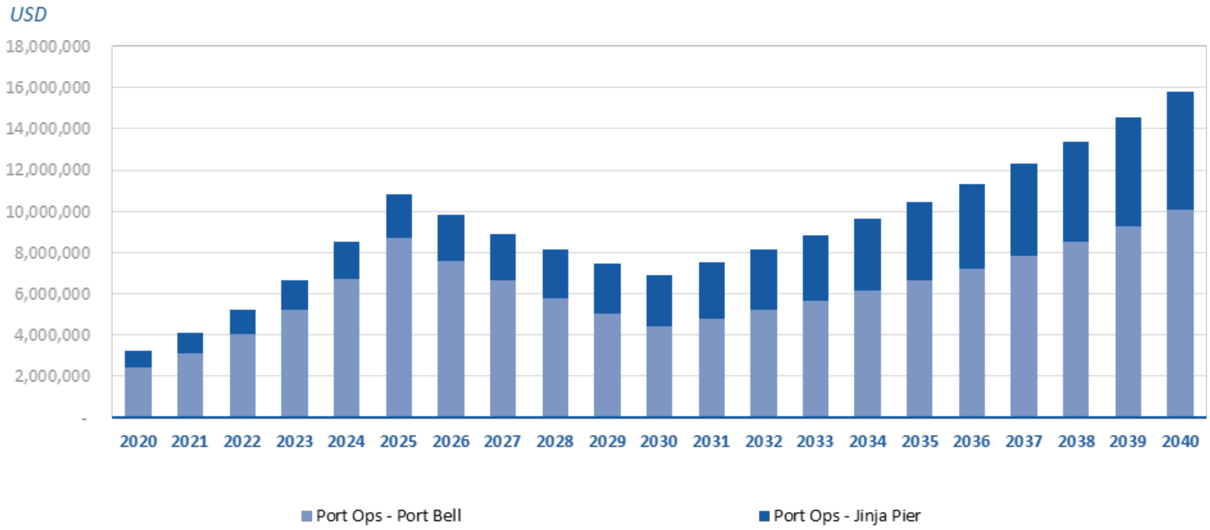
Lot 6

8.5 Area C - Port Bell & Jinja Operations

8.5.1 Revenue analysis

The following figure presents the revenues from port operations for Port Bell and Jinja Pier. The remark is made that the cargo handling capacity in 2025 is capped for the freight vessels in project area A. However, considering there are more freight vessels operating on Lake Victoria, it is expected that the competition handles the surplus of cargo. This results in the revenues for the ports reflecting the traffic forecast.

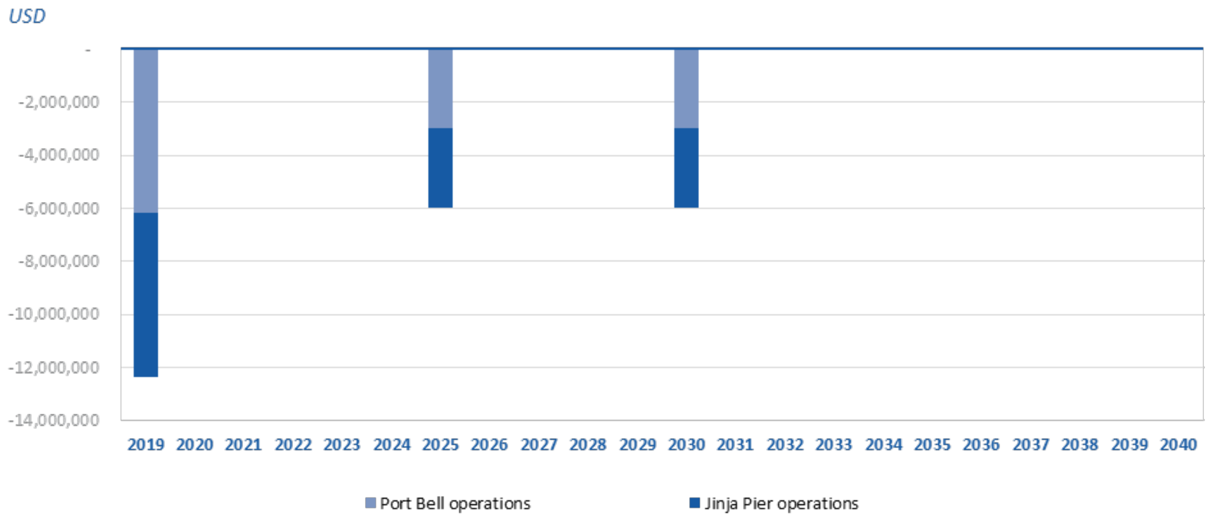
Figure 8.10 Revenue of port operations in Port Bell and Jinja Pier



8.5.2 Capex analysis

The following figure presents the capex of the port operations for Port Bell and Jinja Pier. One year prior to commencement of operations, construction for the rehabilitation and expansion works is carried out. Other than the expansion of the freight vessel fleet in project area A, investments ought to be made before start of operations. It is assumed that the lifetime of the rehabilitation investments is in parallel with the concession period.

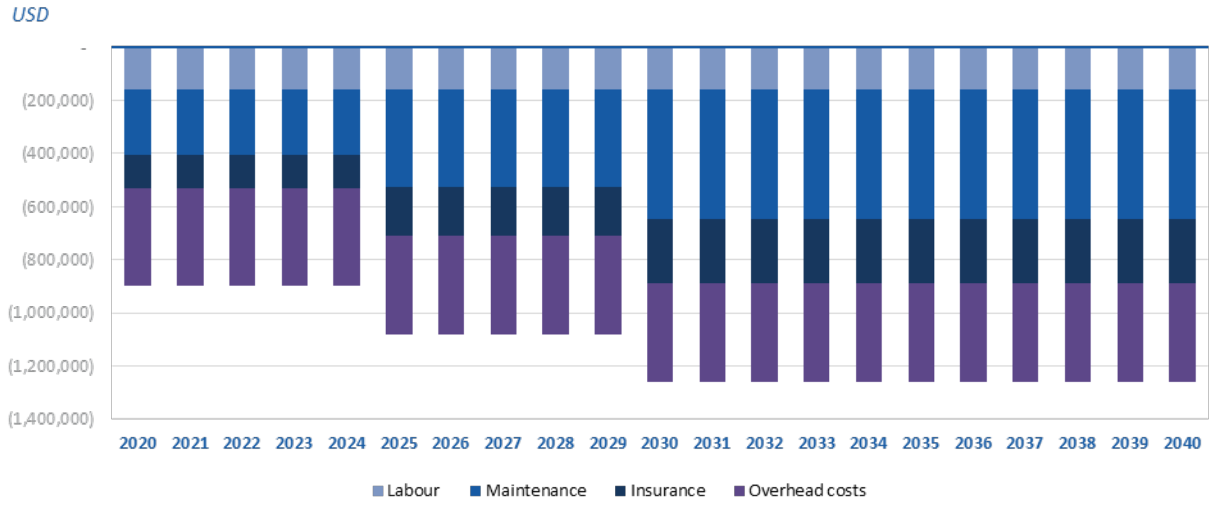
Figure 8.11 Capex of Port Bell and Jinja Pier Developments



8.5.3 Opex analysis

The following figure presents the opex of the port operations for Port Bell and Jinja Pier combined. Maintenance to the infrastructure (2% of the capex per year) is the main driver of the operational costs. The operational costs increase over time, in line with the expansion of Port Bell.

Figure 8.12 Opex of port operations for Port Bell and Jinja Pier



8.5.4 Financial viability

Combining the previous sections, and the corporate tax, we provide an overview of the financial indicators and annual project cash flows for the port operations. The cash flows include the revenues, opex, capex, tax and divestment. For sake of comparison, we also present the free cash flows of the port operations for the Port Bell and Jinja Pier separately.

The main conclusions for the financial viability of Project Area C - Port Bell & Jinja Pier operations are:

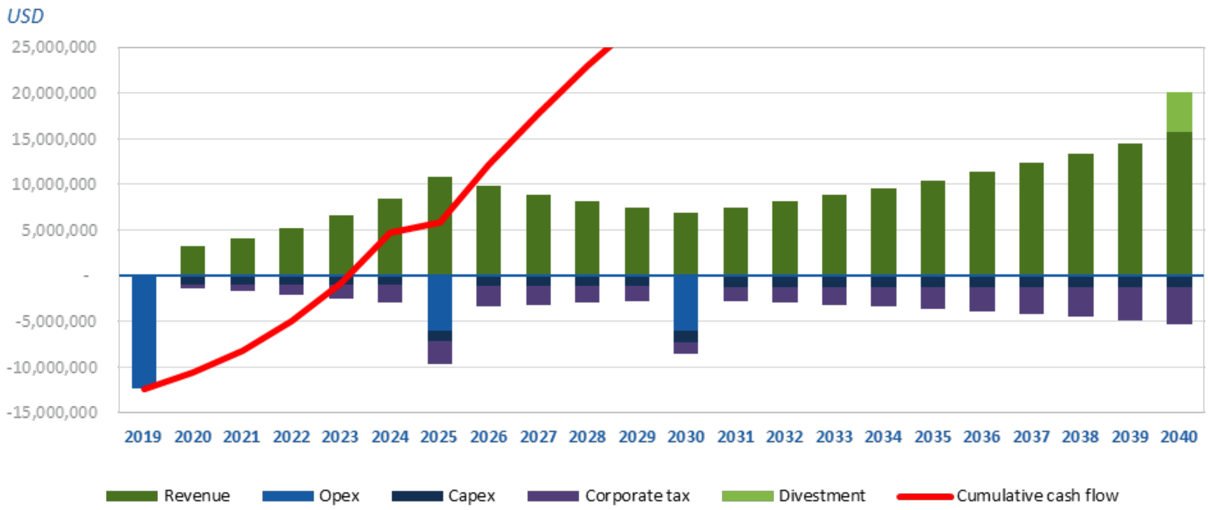
- The project business case for Project Area C is financially feasible, with an NPV of 11.5 M USD.;
- The results of the project business case is driven by the operations in Port Bell; and
- Although not as profitable, port operations in Jinja Pier yield financially feasible results.

Table 8-8 Financial indicators of the port operations

	Combined project	Port Bell	Jinja Pier
Project NPV FCF (USD)	11,539,308	11,480,290	59,017
Project IRR	27.18%	40.92%	13.14%
Payback year	2024	2023	4060
Funding requirement (USD)	12,374,000	6,187,000	6,187,000

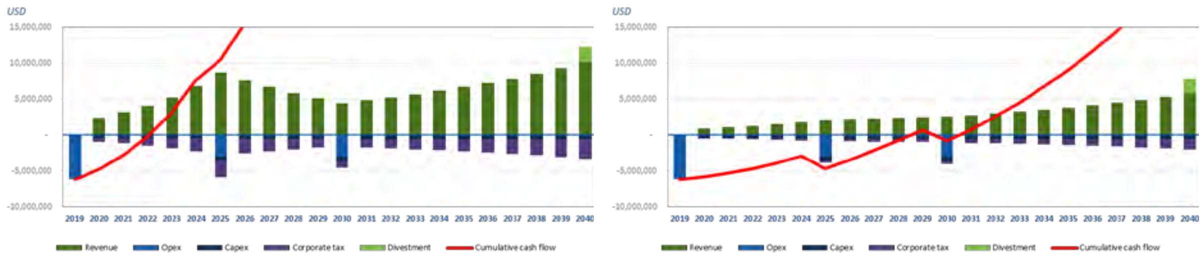
The following figure presents the free cashflow for the port operations for Port Bell and Jinja Pier combined.

Figure 8.13 Free cashflow for the port operations for Port Bell and Jinja Pier combined



The following figures present the free cashflow for the port operations for Port Bell and Jinja Pier separately.

Figure 8.14 Free cashflow for the freight vessel operations for Port Bell



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9 Economic Social Cost Benefit Analysis

Summary

This chapter presents the Economic Social Cost Benefit Analysis (ESCBA) for private sector involvement in each of the three Project Areas. In this chapter, we highlight the economic benefits of the Project Implementation versus the case where the Project is not implemented for each of the three Project Areas.

Million USD	ENPV	Total	2019-2020	2021-2025	2026 2030	2031-2035	2036-2040
Costs							
Capex	79.7	93.7	70.0	46.6	11.7	23.3	(57.9)
Opex	102.8	715.2	15.7	130.6	152.2	174.4	242.2
Total costs	182.5	808.8	85.7	177.2	163.9	197.8	184.3
Benefits							
TCS	47.6	186.7	3.3	35.9	39.3	42.7	65.4
ECT	869.6	3,431.5	61.1	642.7	720.4	795.3	1,211.8
Total benefits	687.1	2,622.7	(24.6)	465.5	556.5	597.5	1,027.5
Net cash flows	**79.7**	**93.7**	**70.0**	**46.6**	**11.7**	**23.3**	**(57.9)**

Million USD	ENPV	Total	2019-2020	2021-2025	2026 2030	2031-2035	2036-2040
Costs							
Gap Funding	105.9	448.5	18.3	92.3	100.7	113.7	123.5
Incr. Transport costs	5.8	126.5	12.4	46.9	31.2	21.7	14.4
Total costs	**111.7**	**575.0**	**30.7**	**139.2**	**131.9**	**135.4**	**137.9**
Benefits							
Accident prevention	3,446.6	11,468	546	2,730	2,730	2,730	2,730
Total benefits	**3,446.6**	**11,468**	**546**	**2,730**	**2,730**	**2,730**	**2,730**
Net cash flows	**3,334.9**	**10,893.0**	**515.3**	**2,590.8**	**2,598.1**	**2,594.6**	**2,592.1**

Million USD	ENPV	Total	2019-2020	2021-2025	2026 2030	2031-2035	2036-2040
Costs							
Investments	14.5	27.0	14.0	7.0	7.0	-	-
Divestments	(0.4)	(4.7)	-	-	-	-	(4.7)
Total costs	14.1	22.3	14.0	7.0	7.0	-	(4.7)
Benefits							
TCS	822.0	3,244.8	57.8	606.8	681.1	752.6	1,146.4
ECT	47.6	186.7	3.3	35.9	39.3	42.7	65.4
Total benefits	869.6	3,431.5	61.1	642.7	720.4	795.3	1,211.8
Net cash flows	**855.5**	**3,409.2**	**47.1**	**635.7**	**713.4**	**795.3**	**1,216.5**

9.1 Introduction

This chapter presents the Economic Social Cost Benefit Analysis (ESCBA) for private sector involvement in each of the three Project Areas. In this chapter, we highlight the economic benefits of the Project Implementation versus the case where the Project is not implemented for each of the three Project Areas. The purpose of the ESCBA is to complement the previously presented financial analyses in chapter 8 with an overview of the economic and social effects of the proposed interventions.

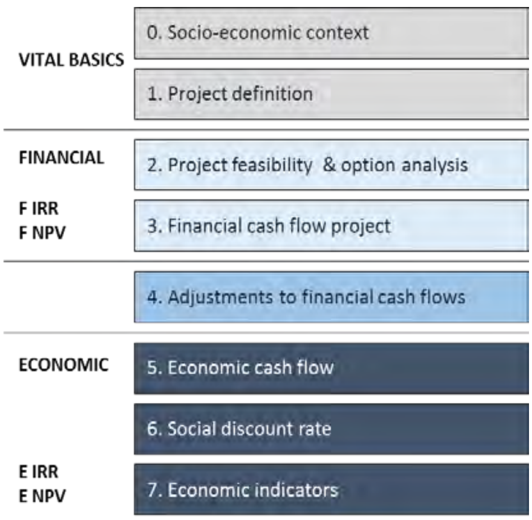
The methodology for the ESCBA is presented in the second section of this chapter. Section 9.3 discusses the main assumptions for this ESCBA in detail. Sections 9.4 to 9.6 continue with the calculation of Economic Costs and the calculation of Economic Benefits for each respective Project Area. The conclusion of the ESCBA is presented in sections 9.4.3, 9.5.3 and 9.6.3.

9.2 Methodology Applied in this ESCBA

9.2.1 Step-wise Approach for the Calculation of Economic and Social Cash Flows

Figure 9.1 presents the stepwise approach that is applied towards the ESCBA. Eight steps are executed over four stages. The first stage, the so called 'vital basics', is a generic component applied to all types of costs and benefits. The other three stages, which concern the translation of the financial business case results, are conducted per individual cost- and benefit component.

Figure 9.1 ESCBA approach



In the vital basics stage, the 'Project Case' and the 'No-Project Case' are defined: the determination of the Project Case is essential for the approach to the input of the other three stages.

In the second stage, the relevant inputs from the financial feasibility analysis are incorporated into the analysis. The input derived from the financial feasibility analysis focuses on the capex, opex , timing and traffic components.

The third stage in the ESCBA is to translate the financial results into economic cash flows. This is done by means of conversion and allocation factors. Through conversion factors, the shadow prices of the costs and benefits are calculated. The allocation factors correct for double-counting and for costs and benefits occurred outside or flowing out of the national economy.

The last stage in the ESCBA is used to project economic cash flows. By applying the social discount rate to the economic cash flows, the Net Present Value and the economic internal rate of return (EIRR) of the cash flows can be determined.

Conversion Factors and Allocation Factors

The translation of financial cash flows to economic cash flows is conducted by means of conversion and allocation factors. Through conversion factors, the shadow prices of the costs and benefits are calculated. The allocation factors correct for double-counting of effects. An elaboration of both factors is presented below.

Conversion Factors

The financial feasibility assessment is based on market prices. When market prices do not reflect the social opportunity cost of inputs and outputs, the usual approach is to convert them into accounting prices using appropriate conversion factors. Reasons that the market prices do not accurately reflect the social opportunity costs of input and output can be:

- Inefficient markets; or
- Setting non cost-reflective tariffs on public services.

The adjustment to accounting prices is in general substantial for wages and for fiscal corrections. Typically, in an economy characterised by extensive unemployment or underemployment, the opportunity cost of labour used in the project may be less than the actual wage rates.

Allocation Factors

The net present values of the economic costs need to be allocated to the Ugandan economy. Not all costs can be allocated to the Ugandan economy, as some of the expenses create economic benefits for the Ugandan economy.

For every component of the ESCBA, an allocation factor is assumed based on a qualitative argumentation.

9.2.2 Case Setting and Hypotheses

The project definition distinguishes two cases respectively for the three Project Areas: a Project Case and a No-Project Case. For both cases, the main assumptions are presented in the three tables below. The economic effects for both cases are a direct consequence of the assumptions set in the project definition. Ultimately, the economic impact of the three Project Areas is calculated by the determination of the difference between the Project Case and the No-Project Case. Hence, the ESCBA focuses on incremental economic effects rather than absolute economic effects. This approach is applied to calculate the economic benefits. This component is in nature a cost the economy. By calculating the incremental effect, the cost savings of the project case vis-à-vis the no-project case can be calculated; this creates benefits for the economy.

Case setting

The three tables below present a comparison of the Project case and the No-Project Case for each respective Project Area.

The 'Project Case' must be clearly distinguished from the 'No-Project Case'. The No 'Project Case' represents the counterfactual, that is, the do-minimum case required to preserve the as-is situation over the course of the time period defined in the 'Project Case'. The economic and social CBA evaluates the necessary incremental investments required to realise the 'Project Case' vis-à-vis the 'No-Project Case'. This results in the Project-Case and No-Project Case for each respective Project Area, as presented in the following table.

Table 9-1 Project Case versus No-Project Case for the freight and passenger vessels

	'Project Case'	'No-Project Case'
Project Area A - Freight vessel operations		
Assumptions	Acquisition of freight vessels	No capex investments
Implications	Number of freight vessels on Lake Victoria increase, improving the connection between Tanzania and Kenya to and from Uganda.	Number of freight vessels on Lake Victoria is insufficient to handle all freight. Incremental freight to and from Tanzania and Kenya is forced to use road connection.

	'Project Case'	'No-Project Case'
Project Area B - Ferry services		
Assumptions	Wooden passenger boats are replaced Acquisition of ferry vessels Rehabilitation and construction of Landing Sites	No capex investments Island inhabitants remain dependent on wooden passenger boats
Implications	Ferry services are reliable, safe, faster and depart according to a timetable More routes are established	Ferry services are unreliable, unsafe, slow and depart unregularly
Project Area C - Port Bell & Jinja Pier operations		
Assumptions	Port Bell and Jinja Pier are rehabilitated	No capex investments
Implications	Capacity for loading and unloading freight vessels increases, improving the connection between Tanzania and Kenya to and from Uganda.	Capacity for loading and unloading freight vessels remain limited. Incremental freight to and from Tanzania and Kenya is forced to use road connection.

Hypotheses

- Hypothesis 1:
  The increased operational capacity and efficiency, created by the freight vessels of Project Area A, will generate a Net Economic Benefit for the country of Uganda. The incremental costs related to the fleet acquisition and the operational expenditures are outweighed by the incremental economic benefits.
- Hypothesis 2:
  The replacement of the current limited ferries and wooden passenger boats by a safe, reliable and faster network, created by the ferry vessels of Project Area B, will generate a Net Economic Benefit for the country of Uganda. The incremental costs related to the fleet acquisition and the operational expenditures are outweighed by the incremental economic benefits.
- Hypothesis 3:
  The increased operational capacity and efficiency, created by the rehabilitation and operations of Port Bell and Jinja Pier in Project Area C, will generate a Net Economic Benefit for the country of Uganda. The incremental costs related to the fleet acquisition and the operational expenditures are outweighed by the incremental economic benefits.

9.2.3 Effects Included in the ECBA

Table 9-2 presents the structure of the ESCBA. The overall economic effect is the result of the combination of economic costs and economic benefits.

Table 9-2 Effects included in this ESCBA

	Economic costs	Economic benefits
Project Area A - Freight vessel operations		
	Incremental capex and opex	Transport cost savings Savings of external costs of transportation
Project Area B - Ferry services		
	Gap funding Incremental transport costs	Accident prevention

	Economic costs	Economic benefits
Project Area C - Port Bell & Jinja Pier operations		
	Incremental capex and opex	Transport cost savings Savings of external costs of transportation

Incremental financial revenues have not been included in the ESCBA for Project Area A - freight vessels and Project Area C - Port operations: The financial revenue for the incremental traffic is no benefit to the Ugandan economy, because in the No Project Case, revenues of the incremental traffic are earned via the road connection. The routes on Lake Victoria are an optimisation to the existing road connection.

9.3 Main assumptions

This section presents the main assumptions and the framework for economic benefits.

- The time horizon of this ESCBA has been set to 2040;
- The Social Discount Rate is estimated at 4.0%; based on the calculation of the table on the following page; and
- The relevant incremental freight and passenger traffic projections are presented below.

Time horizon

The time horizon for this economic and social CBA has been set to 2040. This is in line with the business cases for the three Project Areas: The financial cash flows and relating input (e.g. traffic) has been forecasted up to 2040, and hence it is practical to set the horizon for the ESCBA to 2040. At the end of the period, all assets are sold at book value. This is a conservative proxy; the market value of the assets is likely to be higher than the book value.

Social discount rate

The social discount rate is one of the most important assumptions for an ESCBA. The social discount rate is the hurdle rate for the Economic Rate of Return (ERR), and is used to calculate the Economic Net Present Value (ENPV). The two most popular approaches to estimate the social discount rate are:

- The Social Rate of Return on Private Investments (SRRI); and
- The Social Rate of Time Preference (SRTP).

Social Rate of Return on Private Investments (SRRI)

The SRRI approach assumes that the Social Rate of Return is equal to the required return on Private Investments. Despite the popularity of the approach, there are major drawbacks of this approach. The drawbacks are exaggerated by sub-optimal efficiency of capital markets, which is the case in Uganda. The EU Guide on Cost-Benefit analysis provides an excellent summary of the main drawback:

Annex II of the EU Guide to Cost-Benefit Analysis of Investment Projects (page 301):
"The social rate of return on private investments (SRRI) is based on the idea that public investments displace private investments. Therefore, according to this approach, the return from the public investment should be at least as big as the one that could be obtained from a private investment. As a result, the SDR is considered equal to the marginal social opportunity cost of funds in the private sector. As mentioned by many economists (Boardman et al., 2006, Barrett et al., 1999, Arrow and Lind, 1997), the SRRI approach is generally biased toward high estimates of the SDR. There are two main causes of this bias: first, externalities and market failures distort private investment returns and may generate private investment returns higher than the social ones; secondly, the observed private return on investments usually includes a risk premium. This is however not to be included in the SDR because society as a whole, or the government, has a much larger portfolio than any private investor has and consequently is able to exploit risk pooling. As an empirical estimation of the SRRI is typically based on observed returns in the private financial markets, one additional concern here is market volatility and the role of asset bubbles."

We consider the drawbacks that are mentioned in the excerpt above particularly relevant for Uganda: the required return on private investments includes a significant risk premium. Hence, the use of the SRRI would result in an upward biased estimation of the social discount rate.

Elasticity of marginal social welfare

This elasticity of marginal social welfare ('e') is generally between 1 and 2, in which 1 represents a low elasticity and 2 a high elasticity of social welfare with respect to public expenditure. A low elasticity implies that for every additional dollar spent by public authorities, the social welfare increases only marginally. In contrast, an elasticity close to 2 implies a strong increase in social welfare in case of increased public spending.

Given the size of the Ugandan economy, the elasticity of public spending is naturally limited in comparison to smaller countries. However, there is still significant progress to be made in social welfare. As such, the elasticity of social welfare with respect to public spending is set at 1.5.

The expected per-capita consumption growth

The term 'g' represents the expected per-capita consumption growth. The assumption for the real GDP per capita growth rate in the forecast period is set at 6.0%. The compounded annual growth rate of the last 27 years is 8.4%. It is assumed this growth rate will continue in the short term, and will slow down to 5.0% at the end of the forecasting period (i.e. 2040). This results in an estimated 6.0% compounded annual growth rate of real for the entire forecasting period.

Pure Time Preference

The term 'p' represents the rate of pure time preference; this term is called the 'dead rate' since it is additional and independent of the other factors. The dead rate is set at 1.3%, which is conform the generally applied values in economic and social CBAs.

It is a difficult task to estimate the Time Preference Rate for individual countries, and there is no consensus in academic literature on the calculation method. Some scientists have suggested to use the death rate of a country (number of deaths per 1,000 people), a reflection of the possibility that individuals' discount rates are affected by the probability of survival from one period to the other. This would imply a Time Preference Rate of approximately 0.8% for Uganda, which is in line with mortality rates of developing countries. Still, the Time Preference Rates for most developed countries are adjusted to 1% – 1.5%. We have followed this trend in empirical studies, and hence set the rate for Uganda at 1.3.

Resulting Social Discount Rate

Table 9-3 presents the Social Discount Rate that results from the assumptions that are highlighted in the preceding sections. The Social Discount Rate is estimated at 10.3%. The following remarks are made regarding this Social Discount Rate:

- The assumptions for the expected per-capita consumption growth and the time preference rate are relatively high, which implies that the social discount rate is also relatively high;
- The Ugandan Social Discount Rate is higher than Social Discount Rates that are generally used for developing countries.

The relatively high social discount rate is justified by the status of the Ugandan economy and the growth prospects for the short- and medium-term future. Nevertheless, during the interpretation of the economic output we should be aware of the implications of this high Social Discount Rate.

Table 9-3 ECBA - Social Discount Rate

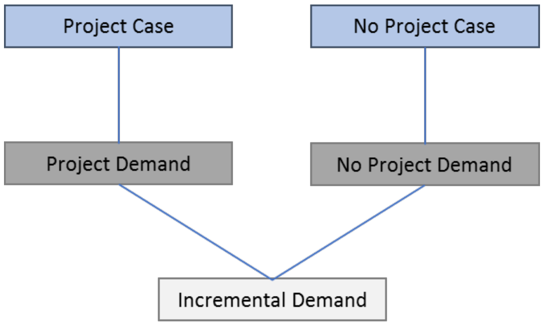
	Factor	Assumed value
e	elasticity of marginal social welfare with respect to public expenditure	1.5
g	expected per-capita consumption growth	6.0%
p	rate of pure time preference	1.3%
r	**social discount rate**	**10.3%**

It is important to note that, as a result of the application of the real GDP per capita growth figure, all cash flows will have to be on a real basis as well. Hence, inflation is excluded from this economic and social CBA.

9.3.1 Incremental Demand Assumptions

As the economic value of the project is calculated as the difference between the economic performance of the project case versus the economic performance of the no project case, the majority of (economic) cash flows included in the ECBA are based on incremental traffic flows.

Figure 9.2 - ESCBA - Incremental Demand



The incremental traffic flows for freight volumes are calculated by subtracting the projected no-project case demand flows from the projected project case demand flows. The table below summarise the project case traffic flows, the no-project case traffic flows, and the resulting incremental traffic flows.

Table 9-4 Incremental traffic flows for freight

	Total	2020	2025	2030	2035	2040
Port Bell - Mwanza						
Project	20,862,503	231,500	800,000	850,000	1,295,663	1,975,000
No-Project	6,456,584	32,000	360,500	266,500	386,475	560,500
Incremental	14,405,919	199,500	439,500	583,500	909,188	1,414,500
Port Bell - Kisumu						
Project	20,937,861	460,000	2,060,000	586,000	885,368	1,301,000
No-Project	535,000	-	107,000	-	-	-
Incremental	20,402,861	460,000	1,953,000	586,000	885,368	1,301,000
Jinja Pier - Mwanza						
Project	17,216,851	253,000	621,000	699,000	1,062,806	1,616,000
No-Project	3,051,936	29,000	81,000	136,000	204,984	310,000
Incremental	14,164,916	224,000	540,000	563,000	857,821	1,306,000
Jinja Pier - Kisumu						
Project	1,669,286	19,000	46,000	77,000	110,287	158,000
No-Project	-	-	-	-	-	-
Incremental	1,669,286	19,000	46,000	77,000	110,287	158,000

9.3.2 Incremental Distance Assumptions

In this section we present the underlying assumptions for the distance covered of the incremental traffic for freight transport in Project Areas A and C in the Project Case and the No-Project Case. Purpose of the distances in the respective cases is to determine (external) transport cost savings. The distance covered depends on: Project Case or No-Project Case; which freight vessel route is taken; and the destination/origin within Uganda. Figure 9.3 presents the distribution of origins and destinations in zones within the country of Uganda. For each zone, we have determined the distance from Dar es Salaam and the distance from Mombasa (Google Earth' route-tool was used to estimate the driving distances). The difference in distance between transport entirely via road, and transport via Lake Victoria is calculated in the tables in this section. The distance covered by road and the distance covered by water is presented separately, as the mode of transport affects the applicable unit rate applied later in this chapter.

Figure 9.3 Distribution of origin / destination within Uganda

Table 9-5 Distance overview for respective routes

Route	Distance (km)
Port Bell to Mwanza	344
Port Bell to Kisumu	319
Jinja Pier to Mwanza	277
Jinja Pier to Kisumu	355

Table 9-6 Distance overview for Port Bell - Mwanza route and vice versa - Entirely via road and via Lake Victoria

	100% Road connection	Road connection via Lake Victoria			Delta
End destination	1. DSM to end (km)	2. DSM to Mwanza (km)	3. Port Bell to end (km)	4. Total (2+3) (km)	Delta (1-4) (km)
Kampala	1,485	1,109	10	1,119	**366**
Jinja	1,404	1,109	81	1,190	**214**
Lukaya	1,565	1,109	114	1,223	**342**
Hoima	1,786	1,109	210	1,319	**467**
Gulu	1,662	1,109	344	1,453	**209**

Table 9-7 Distance overview for Port Bell - Kisumu route and vice versa - Entirely via road and via Lake Victoria

	100% Road connection	Road connection via Lake Victoria			Delta
End destination	1. Mombasa to end (km)	2. Mombasa to Kisumu (km)	3. Port Bell to end (km)	4. Total (2+3) (km)	Delta (1-4) (km)
Kampala	1,143	824	10	834	**309**
Jinja	1,063	824	81	905	**158**
Lukaya	1,245	824	114	938	**307**
Hoima	1,357	824	210	1,034	**323**
Gulu	1,320	824	344	1,168	**152**

Table 9-8 Distance overview for Jinja Pier to Mwanza route and vice versa - Entirely via road and via Lake Victoria

	100% Road connection	Road connection via Lake Victoria			Delta
End destination	1. DSM to end (km)	2. DSM to Mwanza (km)	3. Jinja to end (km)	4. Total (2+3) (km)	Delta (1-4) (km)
Kampala	1,485	1,109	85	1,194	**291**
Jinja	1,404	1,109	10	1,119	**285**
Lukaya	1,565	1,109	187	1,296	**269**
Hoima	1,786	1,109	298	1,407	**379**
Gulu	1,662	1,109	385	1,494	**168**

Table 9-9 Distance overview for Jinja Pier to Kisumu route and vice versa - Entirely via road and via Lake Victoria

	100% Road connection	Road connection via Lake Victoria			Delta
End destination	1. Mombasa to end (km)	2. Mombasa to Kisumu (km)	3. Jinja to end (km)	4. Total (2+3) (km)	Delta (1-4) (km)
Kampala	1,143	824	10	834	**309**
Jinja	1,063	824	81	905	**158**
Lukaya	1,245	824	114	938	**307**
Hoima	1,357	824	210	1,034	**323**
Gulu	1,320	824	344	1,168	**152**

9.4 Area A - Freight vessel operations

Table 9-10 project case versus no-project case for the freight vessel operations

	Economic costs	Economic benefits
Project Area A - Freight vessel operations		
	Incremental capex and opex	Transport cost savings Savings of external costs of transportation

9.4.1 Calculation of economic and social costs

This section presents the calculation of the economic and social costs that are generated by Project Area A - Freight vessel operations. The economic and social costs for Project Area A consists of incremental capex and opex.

Incremental capex and opex

The economic and social costs of the project consist of incremental capex and opex that are created by the Project. Hence, we need to convert financial cash flows that are projected in the business case into economic cash flows. In this section, we will first summarise the capex and opex figures of the business case. Next, we discuss the conversion and allocation factors for each line component of the economic benefits. At the end of this section, we discuss the NPV of the economic cash flows that result from the financial cash flows and conversion and allocation factors.

Financial cash flows

Table 9-11 presents the summary of the financial cash flows for the capex and opex. The financial cash flows are on a real basis; no inflation is included in the figures.

Table 9-11 Financial cash flows - Direct economic costs for freight vessel operations

Capex item	Total	2019	2020	2021-2024	2025-2030	2031-2035	2036-2040
Capex							
Investments	198.2	58.3	11.7	46.6	11.7	23.3	46.6
Divestments	(104.6)	-	-	-	-	-	(104.6)
Opex							
Fuel	196.7	-	4.2	36.2	41.8	47.5	66.9
Lubricants	45.4	-	0.6	7.1	9.6	11.2	16.8
Labour	13.7	-	0.3	2.4	2.9	3.3	4.8
Maintenance	61.8	-	1.5	11.5	13.1	15.4	20.3
Insurance	61.8	-	1.5	11.5	13.1	15.4	20.3
Overhead	18.2	-	0.9	4.3	4.3	4.3	4.3
Total	**491.2**	**58.3**	**20.7**	**119.6**	**96.5**	**120.4**	**75.4**

Allocation and Conversion factors

The conversion and allocation factors for Project Area A are based on the experience of other Projects; there is no available database for figures of conversion and allocation factors. This is due to the fact that conversion and allocation factors are very project/country-specific.

As explained earlier, the conversion factor is used for the translation to economic cash flows and hence the conversion factor is specific for each country (due to the difference in the economic status of countries). The allocation factors are project specific, since the involvement of local inputs (e.g. contractors, labour and raw material) differs per project.

Table 9-12 presents the assumed conversion and allocation factors for the capex and opex. All factors are set to 1.0, which implies that the full costs are allocated to the Ugandan economy. Also, we assume that the financial price is the economic; no economic gain for additional labour positions during construction is quantified. The assumptions result in the most conservative scenario: it is likely that a share of the investments will not leave the Ugandan economy (e.g. construction input). Yet in the absence of sound data, the conservative approach is necessary to avoid overestimation of the economic benefit of Project Area A.

Table 9-12 Conversion and allocation factors - Incremental capex and opex for freight vessel operations

Component	Conversion factor	Allocation factor
Capex	1.0	1.0
Opex	1.0	1.0

Economic cash flows

Table 9-13 presents the economic cash flows of the capex and opex. A total economic cash flow of approximately 491.2 M USD is projected for the capex and opex. Since all allocation and conversion factors are set to 1, the economic cash flows are exactly like the real financial cash flows. The sale of the assets at book value is estimated at 104.6 M USD.

Table 9-13 Economic cash flows - Incremental capex and opex for freight vessel operations

Capex item	Total	2017	2018	2019-2024	2025-2030	2031-2035	2036-2040
Capex							
Investments	198.2	58.3	11.7	46.6	11.7	23.3	46.6
Divestments	(104.6)	-	-	-	-	-	(104.6)
Opex							
Fuel	196.7	-	4.2	36.2	41.8	47.5	66.9
Lubricants	45.4	-	0.6	7.1	9.6	11.2	16.8
Labour	13.7	-	0.3	2.4	2.9	3.3	4.8
Maintenance	61.8	-	1.5	11.5	13.1	15.4	20.3
Insurance	61.8	-	1.5	11.5	13.1	15.4	20.3
Overhead	18.2	-	0.9	4.3	4.3	4.3	4.3
Total	**491.2**	**58.3**	**20.7**	**119.6**	**96.5**	**120.4**	**75.4**

Table 9-14 presents the Net Present Values of the economic cash flows. The NPV of the capex and opex is estimated at approximately 182.5 M USD.

Table 9-14 NPV of economic cash flows - Direct economic costs for freight vessel operations

Capex item	Total	2017	2018	2019-2024	2025-2030	2031-2035	2036-2040
Capex							
Investments	89.6	43.4	7.9	25.4	3.0	4.2	5.7
Divestments	(9.9)	-	-	-	-	-	(9.9)
Opex							
Fuel	50.6	-	2.8	18.0	13.1	9.0	7.7
Lubricants	11.0	-	0.4	3.5	3.0	2.1	1.9
Labour	3.5	-	0.2	1.2	0.9	0.6	0.6
Maintenance	16.1	-	1.0	5.8	4.1	2.9	2.3
Insurance	16.1	-	1.0	5.8	4.1	2.9	2.3
Overhead	5.5	-	0.6	2.2	1.3	0.8	0.5
Total	**182.5**	**43.4**	**14.0**	**61.9**	**29.4**	**22.6**	**11.2**

9.4.2 Calculation of economic and social benefits

This section presents the calculation of the economic and social benefits that are generated by Project Area A - Freight vessel operations. The economic and social benefits consist of two components: the transport cost savings and the savings of external cost of transportation.

Transport Cost Savings

The first component of the benefits of Project Area A is the transport cost savings for the incremental traffic as a result of the Project. In the No Project case, the incremental traffic of the Project would be diverted via the road connection from and to Uganda. This implies transport cost savings for the incremental traffic in the Project case. There is no effect for the baseline traffic, since this traffic is transported by freight vessels in both cases. Hence, there is a clear focus on the hinterland transport cost savings for incremental domestic traffic.

For the calculation of the hinterland transport cost savings, we focus on the difference between the distance of Dar es Salaam and Mombasa to specific regions in Uganda. The distance tables are presented in section 9.3 Main Assumptions. The hinterland transport distance saving will be translated into a financial value, by making use of a USD per ton/km unit rate. This unit rate is derived from a study conducted by TML and Nautical Enterprise[3], as part of an assignment for the European Commission. The study reports the following relevant unit rates (taxes are also reported, but since taxes are transfer payments they are not considered as part of this analysis):

- Repair: 0.0098 euro per ton/km
- Purchase: 0.0241 euro per ton/km
- Labour: 0.0172 euro per ton/km
- Insurance: 0.0064 euro per ton/km
- Fuel: 0.0154 euro per ton/km

The total relevant unit rates reported in the reference study are therefore 0.0729 euro per ton/km. The input figures are based on European prices, which implies that we must interpret the unit rates with caution. Labour costs are likely to be lower in Uganda, yet fuel costs are likely to be higher due to the higher average age of trucks in Uganda. Hence, we will use the 0.0729 euro per ton/km. The following additional assumption is made:

- EUR/USD conversion: 1 : 1.1

[3] The Competitiveness of European Short-Sea Freight Shipping compared with road and rail transport, August 2010.

Table 9-15 summarises the hinterland transport cost savings per route in Uganda. The total cost saving is estimated at approximately 6,489.6 M USD.

Table 9-15 Transport cost saving per region

Million USD	Total	2020	2025	2030	2035	2040
Port Bell - Mwanza	1,846.0	25.6	56.3	74.8	116.5	181.3
Port Bell - Kisumu	2,614.5	58.9	250.3	75.1	113.5	166.7
Jinja Pier - Mwanza	1,815.1	28.7	69.2	72.1	109.9	167.4
Jinja Pier - Kisumu	213.9	2.4	5.9	9.9	14.1	20.2
Total	**6,489.6**	**115.6**	**381.7**	**231.9**	**354.0**	**535.6**

Allocation and Conversion Factors

Table 9-16 presents the allocation and conversion factors for the transport cost savings. The conversion factor is not applicable, as the unit rates already concern economic cash flows.

The allocation factor of the transport cost savings is 0.5, as the benefits of transport cost savings are strongly dependent on Project Area C - Project. Therefore, the benefits are allocated 50/50.

Table 9-16 Conversion and allocation factors – Transport Costs Savings

Component	Conversion factor	Allocation factor
Transport Cost Savings	N/A	0.5

Economic cash flows

Table 9-17 presents the economic cash flows of the transport cost savings. A total economic cash flow of approximately 3,244M USD is projected for the transport cost savings.

Table 9-17 Economic cash flows – Transport Cost Savings

Million USD	Total	2020	2025	2030	2035	2040
Port Bell - Mwanza	923.0	12.8	28.2	37.4	58.3	90.6
Port Bell - Kisumu	1,307.2	29.5	125.1	37.5	56.7	83.4
Jinja Pier - Mwanza	907.6	14.4	34.6	36.1	55.0	83.7
Jinja Pier - Kisumu	107.0	1.2	2.9	4.9	7.1	10.1
Total	3,244.8	57.8	190.8	115.9	177.0	267.8
ENPV	**822.0**					

It is standard for economic CBAs to also assess the additional economic added value and additional labour positions that are created by the Project, yet these factors are not relevant for this Project as a result of the case setting. In both cases, the total traffic to Uganda does not differ: the cases only differ with respect to the route via Lake Victoria or via road transport.

Savings of external cost of transportation

In the No Project Case, the incremental traffic of the Project would be diverted via road. Since the road connection has a larger distance than via Lake Victoria, this implies an addition cost in the No Project case (or a saving of in the No Project Case). There is no effect of the baseline traffic on the external costs of hinterland transport. This is because there is no difference in baseline traffic and no difference in distance between the Project Case and the No-Project Case. The incremental traffic is relevant for the calculation of the external costs of hinterland transport: this is the traffic that otherwise would have opted for the road connection. For a calculation of the incremental distance for the respective routes, see section 9.3.2.

In the Project case, the incremental traffic is transported via water, which comes at an external cost. To determine the economic benefit of external cost savings in the Project case, the external transport cost of waterborne transport should be added.

In this calculation of the indirect benefits, we quantify the following effects, presented with the according unit rates for the external cost components in Table 9-18.

Table 9-18 Unit rates of external cost components for road freight transport and waterborne freight transport

External cost components	External cost in USD per ton/km	
	Road freight transport	Waterborne freight transport
Accidents	10.20	-
Air Pollution	6.70	5.40
Climate Change Effects	9.80	3.60
Noise Pollution	1.80	-
Up and Downstream	3.00	-
Nature & Landscape Losses	0.70	1.30
Biodiversity losses	0.50	0.40
Soil & Water Pollution	0.80	0.50
Urban Effects	0.50	-
Total	**34.00**	**11.20**

All unit rates are obtained from a study conducted by the CE Delft Institute: External Costs of Transport in Europe (2011). Unfortunately, no extensive academic studies are conducted for the external costs of transport for African countries and hence we have to rely on studies conducted in Europe. All unit rates are converted to a 1.1 USD/EUR conversion rate.

The following definitions are used for the external cost components (the definitions are in line with the definitions as provided by the CE Delft Institute):

Cost of Accidents

Includes Medical costs, production losses, loss of human life. Valuation: Willingness to pay approach for Value of statistical life VSL/Value of Life Years Lost VLYL. Cost allocation to different vehicle categories is based on a two-step approach:

- Intermodal allocation (e.g. road/rail) is based on responsibility.
- Within a transport mode (e.g. road) allocation according to damage potential approach (intrinsic risk).

Air Pollution

Includes Health/medical costs (VLYL), crop losses, building damages, biodiversity losses (biodiversity losses due to air pollution are covered in a separate cost category, see Table 4). Valuation: Impact-Pathway-Approach. Damage cost factors per ton of air pollutant based on NEEDS, HEATCO and UBA.

Climate Change
Cost elements: Avoidance costs to reduce risk of climate change, damage costs of increasing average temperature. Valuation: Unit cost per ton of greenhouse gas (short term acc. to Kyoto targets, long-term acc. to IPCC aims). CO2 emissions per transport mode are based on TREMOVE emission factors and harmonized transport data.

Noise Pollution
Includes annoyance costs and health costs. Valuation: Cost factors for annoyance and health effects per person and dB(A).

Up and Downstream
Includes climate change and air pollution costs of energy consumption and GHG emissions of up- and downstream processes. The focus is hereby on fuel and electricity production. Emissions from vehicle and infrastructure production, maintenance and disposal is not considered.

Costs for Loss of Nature & Landscape
Includes repair cost and restoration measures (e.g. unsealing, renaturation, green bridges). Valuation: definition of reference state, calculation of repair/restoration costs per network-km.

Biodiversity Losses
Includes damage or restoration costs of air pollutant related biodiversity losses.

Soil and Water Pollution
Includes restoration and repair costs for soil and water pollutant. Focus on transport-related heavy metal and hydrocarbon emissions.

Costs of Urban Effects
Focuses on time losses of non-motorized traffic in urban areas.

Table 9-19 presents the outcome of the estimation of the Indirect Economic Benefits. The figures in the table are presented in M USD. There is a positive saving, which implies savings of external cost of transportation. External costs of accidents and climate change are the two main contributors. Biodiversity losses shows an increase in external costs, as freight is transported via Lake Victoria routes.

Table 9-19 Savings of external cost of transportation

USD in Millions	Total	2020	2025	2030	2035	2040
Accidents	139.9	2.5	7.9	5.0	7.7	11.7
Air Pollution	69.8	1.3	4.6	2.4	3.6	5.5
Climate Change	99.8	1.7	6.4	3.5	5.4	8.3
Noise Pollution	25.6	0.5	1.5	0.9	1.4	2.1
Up and Downs.	19.0	0.4	1.5	0.6	1.0	1.5
Nature & Lands.	2.7	0.1	0.3	0.1	0.1	0.2
Biodiversity loss.	(2.0)	(0.0)	0.0	(0.1)	(0.1)	(0.2)
Soil & Water P.	11.4	0.2	0.7	0.4	0.6	0.9
Urban Effects	7.1	0.1	0.4	0.3	0.4	0.6
Total	**373.4**	**6.6**	**23.4**	**13.1**	**20.1**	**30.6**

<u>Allocation and Conversion Factors</u>

Table 9-20 presents the allocation and conversion factors for the transport cost savings. The conversion factor is not applicable, as the unit rates already concern economic cash flows.

The allocation factor of the transport cost savings is 0.5, as the benefits of transport cost savings are strongly dependent on Project Area C - Project. Therefore, the benefits are allocated 50/50.

Table 9-20 Conversion and allocation factors – External Cost Savings

Component	Conversion factor	Allocation factor
External Cost Savings	1.0	0.5

<u>Economic cash flows</u>

Table 9-21 presents the economic cash flows of the external cost savings. A total economic cash flow of approximat47.6 M USD is projected for the financial revenues on the account of Project Area A.

Table 9-21 Economic cash flows – External Cost Savings

USD in Millions	Total	2020	2025	2030	2035	2040
Accidents	70.0	1.2	4.0	2.5	3.9	5.9
Air Pollution	34.9	0.7	2.3	1.2	1.8	2.8
Climate Change	49.9	0.8	3.2	1.8	2.7	4.1
Noise Pollution	12.8	0.2	0.7	0.5	0.7	1.1
Nature & Lands.	9.5	0.2	0.8	0.3	0.5	0.7
Biodiversity los.	1.3	0.0	0.1	0.0	0.1	0.1
Soil & Water P.	(1.0)	(0.0)	0.0	(0.0)	(0.1)	(0.1)
Up and Downs.	5.7	0.1	0.3	0.2	0.3	0.5
Urban Effects	3.6	0.1	0.2	0.1	0.2	0.3
Total	186.7	3.3	11.7	6.6	10.1	15.3
ENPV	**47.6**					

9.4.3 Conclusions of the Economic Cost Benefit Analysis for freight vessel operations

Table 9-22 presents the conclusions of the ESCBA for Project Area A - freight vessel operations in absolute real terms. The total economic and social costs are estimated at approximately 808.8 M USD. The total economic and social benefits are estimated at approximately 190,751 M USD. This results in a net economic benefit of approximately 891.9 M USD.

Table 9-22 Economic and Social CBA outcomes of Project Area A - freight vessel operations

Million USD	ENPV	Total	2019-2020	2021-2025	2026 2030	2031-2035	2036-2040
Costs							
Capex	79.7	93.7	70.0	46.6	11.7	23.3	(57.9)
Opex	102.8	715.2	15.7	130.6	152.2	174.4	242.2
Total costs	182.5	808.8	85.7	177.2	163.9	197.8	184.3
Benefits							
TCS	47.6	186.7	3.3	35.9	39.3	42.7	65.4
ECT	869.6	3,431.5	61.1	642.7	720.4	795.3	1,211.8
Total benefits	687.1	2,622.7	(24.6)	465.5	556.5	597.5	1,027.5
Net cash flows	79.7	93.7	70.0	46.6	11.7	23.3	(57.9)

9.5 Area B - Ferry services

Table 9-23 Project Case versus No-Project Case for ferry services

	Economic costs	Economic benefits
Project Area B - Ferry services		
	Gap funding Incremental transport costs	Accident prevention

9.5.1 Calculation of economic and social costs

This section presents the calculation of the economic and social costs that are generated by Project Area B - Ferry services. The economic and social costs consist of the Gap Funding and incremental transport costs.

Gap Funding

As explained earlier, the direct costs for Project Area B consists of the availability payments paid by the government to the private operator of the ferries. Hence, we need to convert financial cash flows that are projected in the business case into economic cash flows. In this section, we will first summarise the availability payment figures of the business case. Next, we discuss the conversion and allocation factors for each line component of the economic costs. At the end of each section, we discuss the economic cash flows that result from the financial cash flows and conversion and allocation factors.

Financial cash flows

Table 9-24 presents the summary of the financial cash flows for the capex and opex. The financial cash flows are on a real basis; no inflation is included in the figures.

Table 9-24 Financial cash flows - Economic and social costs for ferry vessels

Million USD	total	2,020	2,025	2,030	2,035	2,040
Lot 1	68.1	2.6	2.8	3.2	3.6	4.0
Lot 2	57.5	2.7	2.7	2.7	2.7	2.7
Lot 3	124.7	4.8	4.8	5.8	6.4	7.7
Lot 4	94.7	3.9	3.9	4.9	4.9	5.9
Lot 5	30.3	1.3	1.3	1.3	1.3	2.0
Lot 6	-	-	-	-	-	-
total	375.4	15.4	15.6	18.0	19.1	22.4

Allocation and Conversion Factors

The conversion and allocation factors for Project Area B are based on the experience of other Projects; there is no available database for figures of conversion and allocation factors. This is due to the fact that conversion and allocation factors are very project/country-specific.

As explained earlier, the conversion factor is used for the translation to economic cash flows and hence the conversion factor is specific for each country (due to the difference in the economic status of countries). The allocation factors are project specific, since the involvement of local inputs (e.g. contractors, labour and raw material) differs per project.

Table 9-25 presents the assumed conversion and allocation factors for the capex and opex. All factors are set to 1.0, which implies that the full costs are allocated to the Ugandan economy. Also, we assume that the financial price is the economic; no economic gain for additional labour positions during construction is quantified. The assumptions result in the most conservative scenario: it is likely that a share of the investments will not leave the Ugandan economy (e.g. construction input). Yet in the absence of sound data, the conservative approach is necessary in order to avoid overestimation of the economic benefit of the Project.

Table 9-25 Conversion and allocation factors - Economic and social costs for ferry services

	Conversion factor	Allocation factor
availability payments	1.0	1.0

Economic Cash Flows

The economic incremental capex and opex is presented in Table 9-26 with a total economic cost of 375.4 M USD. The ENPV, calculated using the social discount rate, amounts to 217.0 M USD.

Table 9-26 Economic cash flows - Economic and social costs for ferry services

Million USD	total	2,020	2,025	2,030	2,035	2,040
Lot 1	68.1	2.6	2.8	3.2	3.6	4.0
Lot 2	57.5	2.7	2.7	2.7	2.7	2.7
Lot 3	124.7	4.8	4.8	5.8	6.4	7.7
Lot 4	94.7	3.9	3.9	4.9	4.9	5.9
Lot 5	30.3	1.3	1.3	1.3	1.3	2.0
Lot 6	-	-	-	-	-	-
total	**375.4**	**15.4**	**15.6**	**18.0**	**19.1**	**22.4**

Table 9-27 NPV of economic cash flows - Economic and social costs for ferry services

Million USD	total	2,020	2,025	2,030	2,035	2,040
Lot 1	39.0	2.2	1.9	1.8	1.7	1.6
Lot 2	34.2	2.3	1.9	1.6	1.3	1.1
Lot 3	71.5	4.1	3.4	3.3	3.1	3.0
Lot 4	54.8	3.4	2.8	2.8	2.3	2.3
Lot 5	17.5	1.1	0.9	0.8	0.6	0.8
Lot 6	-	-	-	-	-	-
total	**217.0**	**13.2**	**11.0**	**10.4**	**9.0**	**8.7**

Incremental transport costs

This section focuses on the incremental transport costs as a result of the implementation of Project Area B. Tariffs to be paid by the passengers in the Project case are higher than passengers would pay in the No Project case: the existing ferry services are currently free of charge, and services by wooden passenger boats are cheaper than the fast ferries in Project Area B. The incremental costs for the ferry services are 20% on average.

Financial cash flows

Table 9-28 presents the financial cash flows as presented in the business case. The conversion to economic cash flows and the conversion to incremental revenues is made in the subsequent two tables.

Table 9-28 Financial cash flows – Incremental Transport Costs for ferry vessels

Million USD	total	2,020	2,025	2,030	2,035	2,040
Lot 1	18.8	1.7	1.1	0.8	0.6	0.4
Lot 2	17.3	1.9	1.1	0.7	0.4	0.3
Lot 3	34.4	3.3	2.0	1.5	1.0	0.7
Lot 4	26.8	2.7	1.6	1.3	0.8	0.6
Lot 5	8.6	0.9	0.5	0.3	0.2	0.2
Lot 6	-	-	-	-	-	-
total	105.9	10.4	6.5	4.6	3.0	2.1

Conversion and allocation factors

The conversion and allocation factors for Project Area B are based on the experience of other Projects; there is no available database for figures of conversion and allocation factors. This is due to the fact that conversion and allocation factors are very project/country-specific.

As explained earlier, the conversion factor is used for the translation to economic cash flows and hence the conversion factor is specific for each country (due to the difference in the economic status of countries). The allocation factors are project specific, since the involvement of local inputs (e.g. contractors, labour and raw material) differs per project. Table 9-29 presents the assumed conversion and allocation factors for the incremental transport costs. All factors are set to 1.0, which implies that the full costs are allocated to the Ugandan economy. Also, we assume that the financial price is the economic price; no economic gain for additional labour positions is assumed, as the labour related to the new ferry services likely substitutes part of the labour force working on wooden passenger boats.

The assumptions result in the most conservative scenario: it is likely that a share of the investments will not leave the Ugandan economy (e.g. construction input). Yet in the absence of sound date, the conservative approach is necessary in order to avoid overestimation of the economic benefit of Project Area B.

Table 9-29 Conversion and allocation factors - Economic and social costs for ferry services

	Conversion factor	Allocation factor
Incremental transport costs	1.0	1.0

Economic cash flows

Table 9-30 Economic cash flows - Incremental Transport Costs for ferry vessels

Million USD	total	2,020	2,025	2,030	2,035	2,040
Lot 1	18.8	1.7	1.1	0.8	0.6	0.4
Lot 2	17.3	1.9	1.1	0.7	0.4	0.3
Lot 3	34.4	3.3	2.0	1.5	1.0	0.7
Lot 4	26.8	2.7	1.6	1.3	0.8	0.6
Lot 5	8.6	0.9	0.5	0.3	0.2	0.2
Lot 6	-	-	-	-	-	-
total	**105.9**	**10.4**	**6.5**	**4.6**	**3.0**	**2.1**

Table 9-31 NPV of economic cash flows - Incremental Transport Costs for ferry vessels

Million USD (ENPV)	total	2,020	2,025	2,030	2,035	2,040
Lot 1	0.5	0.0	0.0	0.0	0.0	0.0
Lot 2	0.6	0.1	0.0	0.0	0.0	0.0
Lot 3	0.1	0.0	0.0	0.0	0.0	0.0
Lot 4	0.3	0.0	0.0	0.0	0.0	0.0
Lot 5	1.1	0.1	0.1	0.0	0.0	0.0
Lot 6	3.2	0.3	0.2	0.1	0.1	0.1
total	**5.8**	**0.5**	**0.4**	**0.3**	**0.2**	**0.1**

9.5.2 Calculation of economic and social benefits

This section presents the calculation of the economic and social benefits that are generated by Project Area B - Ferry services. The economic and social benefits comprises the prevention of accidents due to implementation of the Project case.

Accident prevention

This section focuses on accidents prevented as a result of the implementation of Project Area B. The quality of and integration of safety measures in transport projects greatly contributes to preventing accidents, and should be taken into account in the economic and social CBA.

The vast majority of ferries used on Lake Victoria are hand-built wooden passenger boats with planks for seating and a small outboard motor. The ferries are often overloaded and passengers are usually not offered life vests. It is assumed that all accidents related to wooden passenger boats can be prevented in the Project Case.

An estimation of the number of accidents is necessary, as no official records are available. News sources[4] report approximately 5,000 accidents on Lake Victoria on a yearly basis. This number includes accidents with fishermen and accidents on the Tanzanian and Kenyan side of the lake. This number is based on interviews with local officials.

We assume 5% of the total yearly accidents on Lake Victoria are deadly accidents with wooden passenger boats, as fishermen spend relatively more time on the water. We assume 45% of these accidents occur on the Ugandan side of Lake Victoria, as 45% of the lake surface area is within the country borders of Uganda. This results in 113 casualties per year on the account of wooden passenger boats in the Ugandan part of Lake Victoria. An estimated 75% of the wooden transport boats will be replaced by the Project Case. The remaining 25% of the wooden transport boats will continue their services to and from islands that are not included in the service area of the ferry services. This results in an estimated 84 casualties prevented by the Project. This number is held constant during the project period. The assumptions made result in a conservative scenario: it is likely that the number of accidents is higher, yet in the absence of sound data, the conservative approach is necessary to avoid overestimation of the economic benefit of the Project.

The accident prevention will be translated into a financial value by the Value of Statistical Life (VOSL) approach as prescribed by the Guide to Cost-Benefit Analysis of Investment Projects from the European Commission. The VOSL is an estimate of the economic value society places on reducing the average number of casualties by one.

According to the European Commission CBA guide, it is common to include estimates of VOSL into the analysis of projects that affect mortality risks. Estimating the VOSL involves assessing the rate at which people are prepared to trade off income for a reduction in the risk of dying. Evidence from the literature shows that, by convention, the VOSL is usually assumed to be the life of a young adult with at least 40 years of life ahead. For labour income, the annual gross wage rate can be taken as a reference.

[4] http://edition.cnn.com/2013/01/17/world/africa/lake-victoria-weather-deaths/index.html

We assume the annual gross wage rate for Uganda to be 30,480 USD, based on Gross National Income per capita data obtained from the World Bank (2016). This leads to the following economic value to the accidents that are prevented by the Project.

Table 9-32 Economic and social benefit of ferry services

Million USD	Total	2020	2025	2030	2035	2040
Accidents prevented	8,821.2	420.1	420.1	420.1	420.1	420.1

Table 9-33 NPV of economic and social benefit of ferry services

Million USD (ENPV)	Total	2020	2025	2030	2035	2040
Accidents prevented	2,651.2	283.8	173.8	106.5	65.2	39.9

9.5.3 Conclusions of the Economic Cost Benefit Analysis for ferry operations

Table 9-34 presents the conclusions of the ESCBA for Project Area B - ferry vessels in absolute real terms. The total net economic benefit is estimated at approximately 3,344.9 M USD. The Economic NPV of the Project Area is estimated at 3,335 M USD.

Table 9-34 Economic and Social CBA outcomes of Project Area B - ferry vessels

Million USD	ENPV	Total	2019-2020	2021-2025	2026 2030	2031-2035	2036-2040
Costs							
Gap Funding	105.9	448.5	18.3	92.3	100.7	113.7	123.5
Incr. Transport costs	5.8	126.5	12.4	46.9	31.2	21.7	14.4
Total costs	**111.7**	**575.0**	**30.7**	**139.2**	**131.9**	**135.4**	**137.9**
Benefits							
Accident prevention	3,446.6	11,468	546	2,730	2,730	2,730	2,730
Total benefits	**3,446.6**	**11,468**	**546**	**2,730**	**2,730**	**2,730**	**2,730**
Net cash flows	3,334.9	10,893.0	515.3	2,590.8	2,598.1	2,594.6	2,592.1

9.6 Area C - Port Bell & Jinja Pier operations

This section presents the calculation of economic and social CBA of Project Area C - Port Bell and Jinja Pier operations. The case setting for this project area as discussed in section 8.2 is summarised in the table below.

Table 9-35 Project Case versus No-Project Case for the inland ports of Port Bell and Jinja Pier

	Economic costs	Economic benefits
Project Area CA - Freight vessel operations		
	Incremental capex and opex	Transport cost savings Savings of external costs of transportation

9.6.1 Calculation of economic and social costs

This section presents the calculation of the economic and social costs that are generated by Project Area C - Port Bell and Jinja Pier operations. The economic and social costs comprises incremental capex and opex of the Project.

Incremental capex and opex

The economic and social costs of the project consist of incremental capex and opex that are created by the Project. Hence, we need to convert financial cash flows that are projected in the business case into economic cash flows. In this section, we will first summarise the capex and opex figures of the business case. Next, we discuss the conversion and allocation factors for each line component of the economic benefits. At the end of this section, we discuss the NPV of the economic cash flows that result from the financial cash flows and conversion and allocation factors.

Financial cash flows

Table 9-36 presents the summary of the financial cash flows for the capex and opex. The financial cash flows are on a real basis; no inflation is included in the figures.

Table 9-36 Financial cash flows - Incremental capex and opex for Port operations

Capex item	Total	2019	2020	2021-2025	2026-2030	2031-2035	2036-2040
Capex							
Investments	26.8	13.6	-	6.6	6.6	-	-
Divestments	(4.7)	-	-	-	-	-	(4.7)
Opex							
Labour	3.7	-	0.2	0.9	0.9	0.9	0.9
Maintenance	10.2	-	0.3	1.6	2.4	2.9	2.9
Insurance	5.1	-	0.1	0.8	1.2	1.5	1.5
Overhead	8.5	-	0.4	2.0	2.0	2.0	2.0
Total	**30.6**	**13.6**	**0.4**	**8.6**	**8.6**	**2.0**	**(2.7)**

Conversion to economic cash flows

The conversion and allocation factors for Project Area C are based on the experience of other Projects; there is no available database for figures of conversion and allocation factors. This is due to the fact that conversion and allocation factors are very project/country-specific.

As explained earlier the conversion factor is used for the translation to economic cash flows and hence the conversion factor is specific for each country (due to the difference in the economic status of countries). The allocation factors are project specific since the involvement of local inputs (e.g. contractors labour and raw material) differs per project.

Table 9-37 presents the assumed conversion and allocation factors for the Capex. All factors are set to 1.0 which implies that the full costs are allocated to the Ugandan economy. Also, we assume that the financial price is equal to the economic price; no economic gain for additional labour positions during construction is quantified. The assumptions result in the most conservative scenario: it is likely that a share of the investments will not leave the Ugandan economy (e.g. construction input). Yet in the absence of sound date the conservative approach is necessary in order to avoid overestimation of the economic benefit of the Project.

Table 9-37 Conversion and allocation factors - Incremental capex and opex for Port operations

Component	Conversion factor	Allocation factor
Capex	1.0	1.0
Opex	1.0	1.0

Economic cash flows

Table 9-38 presents the economic cash flows of the capex and opex. A total economic cash flow of approximately 35.4 M USD is projected for the capex and opex. Since all allocation and conversion factors are set to 1, the economic cash flows are exactly like the real financial cash flows. The sale of the assets at book value is estimated at 4.7 M USD.

Table 9-38 Economic cash flows - Incremental capex and opex for Port operations

Capex item	Total	2019	2020	2019-2024	2025-2030	2031-2035	2036-2040
Capex							
Investments	26.8	13.6	-	6.6	6.6	-	-
Divestments	(4.7)	-	-	-	-	-	(4.7)
Opex							
Labour	3.7	-	0.2	0.9	0.9	0.9	0.9
Maintenance	10.2	-	0.3	1.6	2.4	2.9	2.9
Insurance	5.1	-	0.1	0.8	1.2	1.5	1.5
Overhead	8.5	-	0.4	2.0	2.0	2.0	2.0
Total	**35.4**	**13.6**	**0.4**	**8.6**	**8.6**	**2.0**	**2.0**

Table 9-39 presents the Net Present Values of the economic cash flows. The NPV of the Capex is estimated at approximately 17.1 M USD.

Table 9-39 NPV economic cash flows - Incremental capex and opex for Port operations

Capex item	Total	2019	2020	2019-2024	2025-2030	2031-2035	2036-2040
Capex							
Investments	14.5	10.1	-	2.7	1.7	-	-
Divestments	(0.4)	-	-	-	-	-	(0.4)
Opex							
Labour	1.1	-	0.1	0.4	0.3	0.2	0.1
Maintenance	2.7	-	0.2	0.8	0.7	0.6	0.3
Insurance	1.3	-	0.1	0.4	0.4	0.3	0.2
Overhead	2.6	-	0.3	1.0	0.6	0.4	0.2
Total	**17.1**	**10.1**	**0.3**	**3.8**	**2.3**	**0.4**	**0.2**

9.6.2 Calculation of economic and social benefits

This section presents the calculation of the economic and social benefits that are generated by Project Area C - Port Bell and Jinja Pier operations. The economic and social benefits comprise transport cost savings and savings of external cost of transportation. The transport cost savings and the external cost of transportation overlap with the operations of freight vessels, as benefits are allocated 50/50 to the two Project Areas. The benefits have been calculated in detail in section 9.4. A summary of the results is presented in this section, to avoid repetition of information in the report.

Transport Cost Savings

The transport cost savings for Project Area C - Port operations overlap with Project Area A - Freight vessel operations. The benefits are allocated 50/50. The transport cost savings are discussed in section 9.4. A summary is presented in the table below.

Table 9-40 Economic cash flows – transport cost savings

Million USD	Total	2020	2025	2030	2035	2040
Port Bell						
Port Bell - Mwanza	923.0	12.8	28.2	37.4	58.3	90.6
Port Bell - Kisumu	1,307.2	29.5	125.1	37.5	56.7	83.4
Subtotal Port Bell	2230.2	42.3	153.3	74.9	115.0	174.0
Jinja Pier						
Jinja Pier - Mwanza	907.6	14.4	34.6	36.1	55.0	83.7
Jinja Pier - Kisumu	107.0	1.2	2.9	4.9	7.1	10.1
Subtotal Jinja Pier	1014.6	15.6	37.5	41.0	62.1	93.8
Grand total	3,244.8	57.8	190.8	115.9	177.0	267.8
ENPV	**822.0**					

Savings of External Cost of Transportation

The savings of external cost of transportation for Project Area C - Port operations overlap with Project Area A - Freight vessel operations. The benefits are allocated 50/50. The savings of external cost of transportation are discussed in section 9.4. A summary is presented in the table below.

Table 9-41 Economic cash flows – transport cost savings for port operations

USD in Millions	Total	2020	2025	2030	2035	2040
Accidents	70.0	1.2	4.0	2.5	3.9	5.9
Air Pollution	34.9	0.7	2.3	1.2	1.8	2.8
Climate Change	49.9	0.8	3.2	1.8	2.7	4.1
Noise Pollution	12.8	0.2	0.7	0.5	0.7	1.1
Nature & Lands.	9.5	0.2	0.8	0.3	0.5	0.7
Biodiversity los.	1.3	0.0	0.1	0.0	0.1	0.1
Soil & Water P.	(1.0)	(0.0)	0.0	(0.0)	(0.1)	(0.1)
Up and Downs.	5.7	0.1	0.3	0.2	0.3	0.5
Urban Effects	3.6	0.1	0.2	0.1	0.2	0.3
Total	186.7	3.3	11.7	6.6	10.1	15.3
ENPV	**47.6**					

9.6.3 Conclusions of the Economic Cost Benefit Analysis for Port Bell and Jinja port operations

Table 9-42 presents the conclusions of the ESCBA for Project Area C – port operations in absolute real terms. The total net economic benefit is estimated at approximately 189,945 M USD. The Economic NPV of the Project Area is estimated at 48,433 M USD.

Table 9-42 Economic and Social CBA outcomes of Project Area C – Port operations

Million USD	ENPV	Total	2019-2020	2021-2025	2026 2030	2031-2035	2036-2040
Costs							
Investments	14.5	27.0	14.0	7.0	7.0	-	-
Divestments	(0.4)	(4.7)	-	-	-	-	(4.7)
Total costs	14.1	22.3	14.0	7.0	7.0	-	(4.7)
Benefits							
TCS	822.0	3,244.8	57.8	606.8	681.1	752.6	1,146.4
ECT	47.6	186.7	3.3	35.9	39.3	42.7	65.4
Total benefits	869.6	3,431.5	61.1	642.7	720.4	795.3	1,211.8
Net cash flows	855.5	3,409.2	47.1	635.7	713.4	795.3	1,216.5

10 PPP Structures

Summary

In this section, potential PPP structures for each of the Influence Areas are introduced and assessed. Subsequently, preferred PPP structures are identified for each of the 3 Influence Areas through Multi Criteria Analyses. The following PPP structures have been selected:

Inlfuence Area A (Shipping Services across the Lake) – Section 10.2.1

- Joint Venture

	Joint Venture	DBFM	BOT / BOO	*Total*
GoU Investments (0.2)	3.0	1.0	6.0	*10.0*
GoU Control (0.2)	4.0	5.0	1.0	*10.0*
Strategic Fit (0.1)	5.0	2.0	3.0	*10.0*
Ease of Implementation (0.1)	4.0	2.0	4.0	*10.0*
Market Appetite (0.2)	3.5	4.5	2.0	*10.0*
Value Maximization (0.2)	4.5	3.5	2.0	*10.0*
Total (Weighted)	**4.1**	**2.9**	**3.0**	***10.0***

Influence Area B (Ferry Operations) – Section 10.2.2

- DBFM

	Management Contract	Joint Venture	DBFM	*Total*
GoU Investments (0.2)	1.0	5.5	3.5	*10.0*
GoU Control (0.2)	3.5	3.5	3.0	*10.0*
Strategic Fit (0.1)	4.0	1.0	5.0	*10.0*
Ease of Implementation (0.1)	4.5	3.0	2.5	*10.0*
Market Appetite (0.2)	5.5	1.0	3.5	*10.0*
Value Maximization (0.2)	2.0	4.5	3.5	*10.0*
Total (Weighted)	**3.3**	**3.3**	**3.5**	***10.0***

Influence Area C (Port Bell and Jinja Operations) – Section 10.2.3

- The ToR prescribes landlord operations; as such, no Multi Criteria Analysis has been carried out for the port operations.

10.1 Introduction to PPP Structures

As it is envisioned that the envisioned Lake Victoria transport projects are (partially) privately financed, this section aims to identify potential PPP structures to be applied for the projects. Due to differences in PPP models for port operations and vessel operations, typical models for both these activities are introduced. First, port management models are introduced and discussed; subsequently, typical shipping management models and their implications are introduced.

The figure below provides an overview of typical port management models, ranging from fully public to fully private structures. Subsequently, a selection of the models is further discussed.

Figure 10.1 Port PPP Models

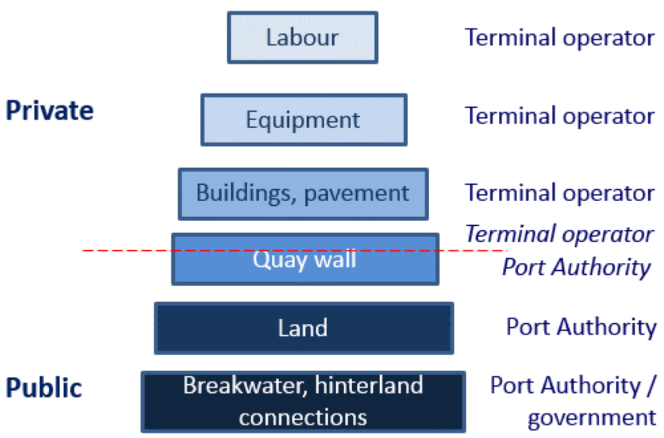
Management Model	Private Involvement	Regulations	Infrastructure	Superstructure	Equipment	Labour & Operations	Nautical Services
Public Service Port	Zero	Public	Public	Public	Public	Public	Public
Tool Port	Very Low	Public	Public	Public	Public	Private	Public / Private
Landlord + Public-Private Terminal	Medium	Public	Public	JV	JV	JV	Public / Private
Landlord Port	Medium	Public	Public	Private	Private	Private	Public / Private
Landlord + DBFM	High	Public	Public & Private	Private	Private	Private	Public / Private
PDMC	Very High	Public	JV	Private	Private	Private	Private
BOT / BOO	Maximum	Public/Private	Private	Private	Private	Private	Private

The public service port and tool port models are deemed unsuitable, as they require substantial investments to be allocated to the public party. As such, the Landlord Port, Port Development Management Company (PDMC), Private Port (BOT), and Design, Build, Finance, and Maintain (DBFM) models are further assessed.

Port Management - Landlord Model

Today's most popular port management model is the landlord port. In a landlord port model, the private stevedoring companies provide and maintain their own superstructure and install their own equipment. The port authority provides port land and common-user port infrastructure, which still concerns significant investments. The landlord's costs should be recovered by port dues received from vessels calling the port and from concession payments received from the various terminal operators. The landlord port authority retains responsibility for the nautical services, which could be conceded to private service suppliers.

Figure 10.2 Landlord PPP Model



The PPP agreement linking the private investor and the terminal developer and operator is a concession agreement. The port authority grants herein a right for a certain period of time to develop and operate a terminal. As compensation, the terminal operator pays a concession fee to the port authority. The level of payment is subject to the level of private investment, the private business case including revenue projections and operational expenditures and the required level of investments for the private investor. Figure 10.2 visualizes the principle landlord structure for one terminal. In most landlord ports, multiple terminal concessions are present.

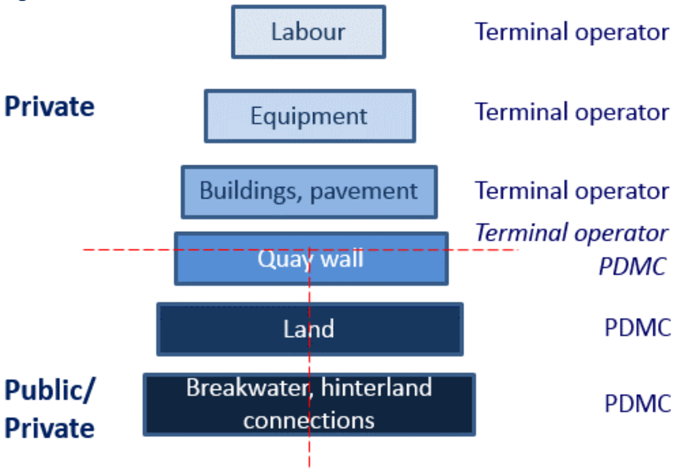
A few of the many landlord port examples include Antwerp, New York, Singapore, Hamburg, and Melbourne.

Port Management - PDMC Model

Developments in Africa and Asia have given rise to a new type of port management model: The Public Private Port Development and Management Company (PDMC model). In this PDMC model, the landlord port developer and port authority itself is established as a public private joint venture. This public-private joint venture is responsible for the overall port development and management of the port.

The PDMC's rights and obligations are defined in a master concession with the relevant public entity. The PDMC is responsible for all investments in common-user infrastructure, superstructure and equipment. It has the right, but not the obligation, to enter into sub-concession contracts with separate terminal operators.

Figure 10.3 PDMC PPP Model



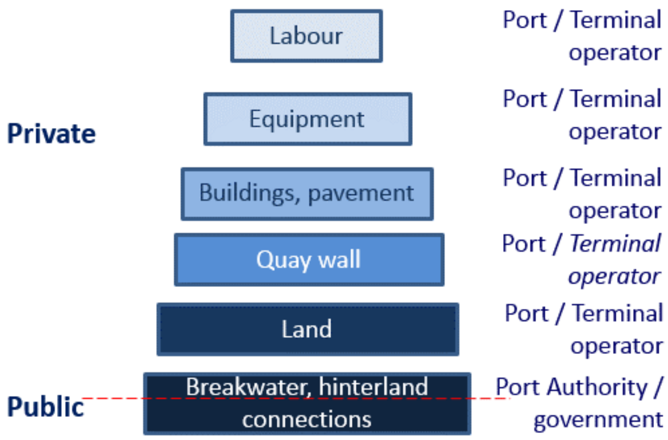
It should be noted that, for the passenger terminal project, no port-level PDMC management model is foreseen, as it is envisioned that the SLPA will remain the port landlord. Rather, a terminal level joint venture development and operating company is envisioned, consisting of the SLPA and one or multiple investors.

Examples of the PDMC model are found in Mozambique, South-Korea, and at new port developments in Nigeria.

Port Management – BOT / BOO Model

The most private port management model concerns the fully private port under a Build Operate Transfer (BOT). In these concession agreements, all responsibilities are allocated to the private port investor, developer and operator. This model typically allocates a significant investment obligation to the private party. On the other hand, as a result of the uneven allocation between public and private side, the private investor will require a long term right and a high flexibility in its port development pace.

Figure 10.4 BOT PPP Model



Fully privatised ports are found in developed areas as UK, Australia, New Zealand, Turkey, but also in less developed areas, such as Liberia. In certain cases, such as London Gateway, a port is even managed under a Build Own Operate (BOO) model. In these models, the transfer back does not occur. In Melbourne, Australia, developments are underway to privatise the landlord port authority. This could also be considered as a BOO or BOT model of an entire port.

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The figure below presents typical shipping management models. Of these models, the management contract model, BOT/BOO model, Joint Venture model, and DBFM model are further discussed.

Figure 10.5 Shipping PPP Models

Management Model	Private Involvement	Regulations	Vessel Procurement	Vessel Maintenance	Labour & Operations	Market Risk
Public Operations	Zero	Public	Public	Public	Public	Public
Management Contract	Minimal	Public	Public	Public	Private	Public
Joint Venture	Depends on stake in JV	Public	JV	JV	JV	JV
DBFM	Very High	Public	Private	Private	Private	Public
BOT / BOO	Very High	Public/Private	Private	Private	Private	Private

Shipping Management - Management Contract Model

Under the management contract (or Operations-Management-Management (OMM)) model, the public body responsible for all investments in the ferry/shipping fleet. A separate OMM contract is subsequently established between the public body and a private ferry operator who then carries the responsibility of operating, maintaining and managing ferry operations. Management contracts are short term arrangements, with contract terms typically ranging between 1 and 5 years.

Advantages

- Straightforward transaction process, low transaction costs
- High expected market appetite, as market risk is allocated to public body
- Some (although limited) transfer of know-how and improved operational performance

Disadvantages

- Substantial public funding since all investments are allocated to the public body
- All market risks are allocated to the public body
- Private sector is not 'locked in' in the project (no capex exposure), limited incentives
- Difficulties in enforcement of discipline by the private operator, as the staff is often still dependent on the public body for working instructions (interface)

Shipping Management - BOT / BOO Model

Under the Build-Own-Operate (BOO) Model, the private operator is responsible for the acquisition and ownership of the ferry/cargo vessel fleet, as well as its operation, maintenance, and management.

Whereas the public party bears substantial market risk in the DBFM model, due to the availability payments, the public body is not exposed to any market risk under the BOT / BOO model; all investments and operational costs are borne by the private party, which is reimbursed solely by the revenues generated from the operations.

The contract duration is usually long term, ranging between 20 to 30 years. The selected period reflects the expected return on investment, as the operator should be able to recover investments during the operations period.

Advantages:

- Private ferry operator can bring up the performance level to be in line with industry best practices

- The private sector is 'locked in' in the project (capex exposure), providing sufficient incentives
- A clear mandate of responsibility for both the public and the private side.

Disadvantages:

- Limited transfer of know-how from private to public side

Shipping Management - Joint Venture Model

The Joint Venture (JV) structure entails the establishment of a joint project entity, in which both the public party and one or multiple private parties hold a stake. The project company is available for all investments and operations, similar to the BOT / BOO model.

Advantages

- Private ferry operator can bring up the performance level to be in line with industry best practices.
- The private and public sector are both 'locked in' in the project (capex exposure), providing sufficient incentives for both parties to act in the best interest of the project.
- Substantial potential for transfer of know-how, due to intensive interaction.

Disadvantages

- Some public investments required. Level of investments depends on the equity stake.
- Joint Ventures can have complex operations, as responsibilities are not always clearly separated in the joint entity. This can result in issues if interests are not aligned.

Shipping Management – DBFM Model

Under the DBFM structure, the private party procures the vessel fleet and is responsible for the operations and maintenance of the vessels. However, under the DBFM structure, the public party bears the market risk. In order to absorb market risk, the public party makes availability payments to the private party that cover the private party's investments and operational costs. These payments are based on the availability of the vessel services, and are irrespective of the revenues generated by the private party. Hence, the private party is not negatively affected by limited cargo or passenger volumes.

DBFM structures are typically applied for projects where revenues are expected to be insufficient to cover investments and operations costs, resulting in the need to further reimburse the private party for such costs. Such projects typically include the development of roads and tunnels or the establishment of ferry services.

Advantages

- Private ferry operator can bring up the performance level to be in line with industry best practices.
- No upfront investments for the publis party.
- The private sector is 'locked in' in the project due to its capex exposure.
- High market appetite for private involvement, as market risk is absorbed by the public party.

Disadvantages

- Public party has a comprehensive payment commitment, irrespective of demand for the provided service (e.g., number of vehicles on a toll road or number of passengers on a ferry service).
- Joint Ventures can have complex operations, as responsibilities are not always clearly separated in the joint entity. This can result in issues if interests are not aligned.

10.2 PPP Structure Selection

In this section, potential PPP structures are identified for each of the Influence Areas. Subsequently, preferred PPP structures are selected for each of the Influence Areas, based on the type of activities and the strategic objectives of the GoU.

10.2.1 Point to Point Cargo Services Across the Lake ("Influence Area A")

Model Identification

For Influence Area A, the following PPP management structures can be distinguished:

- Public Operations
- Management Contract
- Joint Venture (JV)
- DBFM
- BOT / BOO

The level of private involvement in each of these structures is summarised in the table below.

Table 10-1 PPP Structures - Influence Area A

Management Model	Private Involvement	Regulations	Vessel Procurement	Vessel Maintenance	Labour & Operations	Market Risk
Public Operations	Zero	Public	Public	Public	Public	Public
Management Contract	Minimal	Public	Public	Public	Private	Public
Joint Venture	Depends on stake in JV	Public	JV	JV	JV	JV
DBFM	Very High	Public	Private	Private	Private	Public
BOT / BOO	Very High	Public/Private	Private	Private	Private	Private

In order to select a preferred implementation structure, the following two-step process is applied:

- Firstly, models that have 'fatal flaws' (are not considered suitable for the envisioned development) are removed from the options.
- Secondly, the remaining PPP options are qualitatively assessed. Thereto, a MCA is carried out, assessing the remaining structures on several criteria.

Model Selection Step 1 - Assessment of Fatal Flaws

The following two models are deemed unsuitable for the envisioned shipping development project:

- Public Operations – The public operations model lacks private involvement. Hence, the experience from the private sector is not utilised to efficiently carry out the operations. Additionally, the entire investment requirement is allocated to the GoU.
- Management Contract – A management contract, as employed for the MV Kalangala operations, is a very basic PPP model that solely leverages the operational efficiency of the private sector. However, this model still entails that all of the investments are to be made by the GoU.

Model Selection Step 2 – Multi Criteria Analysis

Through an MCA, the remaining 3 management models are assessed on the following criteria:

- GoU Investment Levels
- GoU Control
- Strategic Fit
- Ease of implementation
- Market Appetite
- Value Maximisation

Table 10-2 elaborates on the identified criteria, and allocates a relative importance to each of the criteria. Subsequently, Table 10-3 compares and allocates (unweighted) scores to the three identified PPP structures on each of the criteria. For each criterion, the sum of scores equals 10, in order to avoid double weighting (weighting is done through applying the weights presented in Table 10-2).

Table 10-2 Influence Area A - Overview and Description of PPP Structure Criteria

Criterion	Weight	Description
GoU Investment Levels	0.2	The level of upfront investments and subsequent payments required from the GoU. As the GoU prefers substantial private sector investments, the GoU investment level is considered a key factor in the selection of a preferred PPP structure.
GoU Control	0.2	The GoU control criterion assesses how much control the GoU has in terms of monitoring or directing the activities.
Strategic Fit	0.1	The strategic fit criterion assesses the fit of the management model with the envisioned shipping activities.
Ease of Implementation	0.1	The ease of implementation assessment compares the complexity of the PPP structures during (i) the transaction and contracting phase and (ii) the construction and operations phase.
Market Appetite	0.2	The market appetite comprises the willingness of private parties to be involved, and depends on the incentives provided to the private sector and the perceived commitment of the GoU.
Value Maximisation	0.2	This criterion comprises the potential for knowledge transfer and the potential for leveraging private sector expertise to efficiently attain the GoU's objective of boosting trade on Lake Victoria.

Table 10-3 Influence Area A - PPP MCA Scoring

Model	Score	Justification
GoU Investments		
Joint Venture	3.0	In terms of upfront payments, the GoU can only be held to its equity contribution. The level of the equity contribution depends on the stake that the GoU holds in the JV. No further availability payments or other payments are required.
DBFM	1.0	In the DBFM model, the GoU has no upfront payments. However, substantial availability payments are required to reimburse the private party for the upfront investments and operational costs.
BOT / BOO	6.0	In the BOT / BOO model, the private operator is typically reimbursed through revenues from its operations. As such, the GoU is not required to make any upfront investments or availability payments.
GoU Control		
Joint Venture	5.0	In a Joint Venture, the decision power of the GoU depends on its stake in the JV. However, even with a small stake, JVs provide substantial control options.
DBFM	4.0	DBFM contracts typically entail substantial monitoring and control options for the public party.
BOT / BOO	1.0	Under a BOT / BOO agreement, the public party typically has limited monitoring and control options. Due to issues with preceding PPP options, a structure with more control is advisable.
Strategic Fit		
Joint Venture	5.0	Given adequate volumes, shipping activities typically generate sufficient revenues to cover investments and operational costs; as such, shipping activities are commonly left fully to the private sector or structured in a way that government involvement is limited. However, volumes on Lake Victoria are currently very limited.

Model	Score	Justification
		Additionally, introduction of vessels on Lake Victoria is relatively costly, and relocating vessels to other waterways in case volumes do not improve is nearly impossible. As such, a Joint Venture entity with a minority stake from the GoU may be warranted, as it signals the GoU's commitment to improve the Lake Victoria transport system and entails financial assistance from the GoU, thus lowering the required investment levels from the private sector.
DBFM	2.0	Typically, DBFM contracts are employed when revenues generated from a project are inadequate to cover investments and operational costs (e.g., development of roads). As stated above, shipping activities are often feasible given adequate volumes. As such, a DBFM model is considered an excessive commitment for the GoU, as it entails full repayments of the private sector's costs. Additionally, such a fully cost-covered operation may be perceived as unfair competition by other private parties, thus potentially hampering further development of private sector involvement in the Lake transport system.
BOT / BOO	3.0	The BOT / BOO model fits well with the shipping activities, as it entails limited involvement from the GoU. However, in to the specific Lake Victoria context, more substantial involvement may be required from the GoU to incentivise the private sector to commit to developing the shipping activities.
Ease of Implementation		
Joint Venture	4.0	Establishing a JV entity may be less complex than the procurement and contracting entailed in the other two models; operations under JV can be complex, due to the comprehensive involvement of parties in a JV.
DBFM	2.0	Long and complex operator procurement phase; comprehensive GoU obligations during operations.
BOT / BOO	4.0	Long and complex operator procurement phase; relatively limited GoU obligations during operations.
Market Appetite		
Joint Venture	3.5	The GoU equity stake in the joint entity signals strong commitment from the GoU and reduces capital requirements from the private sector, resulting in a substantial market appetite.
DBFM	4.5	Under the DBFM structure, the operator is fully reimbursed for its costs, irrespective of realised revenues (it is noted that penalties to the operator may apply if the services cannot be provided due to technical issues, as the technical risk is typically still allocated to the private party in a DBFM contract). Hence, market appetite will be high if the project is implemented as a DBFM.
BOT / BOO	2.0	Incentives to the private party are limited under a BOT / BOO agreement. As such, private sector appetite under a BOT / BOO model is typically lower than under the other two management models.
Value Maximisation		
Joint Venture	4.5	Intensive cooperation in the joint entity results in substantial knowledge transfer opportunities. Additionally, the private sector knowledge can be efficiently leveraged under a JV agreement.
DBFM	3.5	The private sector knowledge can be efficiently leveraged under a DBFM agreement. However, knowledge transfer opportunities are limited.
BOT / BOO	2.0	Private sector knowledge can be fully utilised. However, there are limited to no knowledge transfer opportunities.

The table below summarises the weighted scores. From the scores, it is concluded that the Joint Venture is the preferred implementation structure for the shipping activities.

Table 10-4 Influence Area A - PPP MCA Score Summary

	Joint Venture	DBFM	BOT / BOO	*Total*
GoU Investments (0.2)	3.0	1.0	6.0	*10.0*
GoU Control (0.2)	4.0	5.0	1.0	*10.0*
Strategic Fit (0.1)	5.0	2.0	3.0	*10.0*
Ease of Implementation (0.1)	4.0	2.0	4.0	*10.0*
Market Appetite (0.2)	3.5	4.5	2.0	*10.0*
Value Maximization (0.2)	4.5	3.5	2.0	*10.0*
Total (Weighted)	**4.1**	**2.9**	**3.0**	***10.0***

10.2.2 Lake Victoria Passenger Ferry Services ("Influence Area B")

The passenger ferry services comprise both the development and operation of the landing sites and the procurement and operations of the ferry vessels. As such, the selection of a PPP model will take into account the suitability for both the landing site development and the ferry services.

Model Identification

For Influence Area B, the following management structures can be distinguished:

- Public Operations
- Management Contract
- Joint Venture (JV)
- DBFM
- BOT / BOO

The level of private involvement in each of these structures is summarised in the table below.

Table 10-5 PPP Structures - Influence Area B

Management Model	Private Involvement	Regulations	Vessel Procurement	Vessel Maintenance	Labour & Operations	Market Risk
Public Operations	Zero	Public	Public	Public	Public	Public
Management Contract	Minimal	Public	Public	Public	Private	Public
Joint Venture	Depends on stake in JV	Public	JV	JV	JV	JV
DBFM	Very High	Public	Private	Private	Private	Public
BOT / BOO	Very High	Public/Private	Private	Private	Private	Private

In order to select a preferred implementation structure, the following two-step process is applied:

- Firstly, models that have 'fatal flaws' (are not considered suitable for the envisioned development) are removed from the options.
- Secondly, the remaining PPP options are qualitatively assessed. Thereto, a MCA is carried out, assessing the remaining structures on several criteria.

Model Selection Step 1 - Assessment of Fatal Flaws

The following two models are deemed unsuitable for the envisioned shipping development project:

- Public Operations – The public operations model lacks private involvement. Hence, the experience from the private sector is not utilised to efficiently carry out the operations. Additionally, the entire investment requirement is allocated to the GoU.
- BOT / BOO – Revenues generated from ferry operations are typically insufficient to cover for the investments in landing sites and vessels and the operational costs related to operating them. As such, a BOT / BOO model, which provides minimal support from the public party, is deemed unsuited for the ferry operations.

Model Selection Step 2 – Multi Criteria Analysis

Through an MCA, the remaining 3 management models are assessed on the following criteria:

- GoU Investment Levels
- GoU Control
- Strategic Fit
- Ease of implementation
- Market Appetite

Table 10-5 elaborates on the identified criteria, and allocates a relative importance to each of the criteria. Subsequently, Table 10-7 compares and allocates (unweighted) scores to the three identified PPP structures on each of the criteria. For each criterion, the sum of scores equals 10, in order to avoid double weighting (weighting is done through applying the weights presented in Table 10-6).

Table 10-6 Influence Area B - Overview and Description of PPP Structure Criteria

Criterion	Weight	Description
GoU Investment Levels	0.2	The level of upfront investments and subsequent payments required from the GoU. As the GoU prefers substantial private sector investments, the GoU investment level is considered a key factor in the selection of a preferred PPP structure.
GoU Control	0.2	The GoU control criterion assesses how much control the GoU has in terms of monitoring or directing the activities.
Strategic Fit	0.1	The strategic fit criterion assesses the fit of the management model with the envisioned landing site development and ferry activities.
Ease of Implementation	0.1	The ease of implementation assessment compares the complexity of the PPP structures during (i) the transaction and contracting phase and (ii) the construction and operations phase.
Market Appetite	0.2	The market appetite comprises the willingness of private parties to be involved, and depends on the incentives provided to the private sector and the perceived commitment of the GoU.
Value Maximisation	0.2	This criterion comprises the potential for knowledge transfer and the potential for leveraging private sector expertise to efficiently attain the GoU's objective of providing safe and reliable ferry services.

Table 10-7 Influence Area B - PPP MCA Scoring

Model	Score	Justification
GoU Investments		
Management Contract	1.0	Under a management contract structure, the GoU is responsible for all upfront investments in the landing sites and the ferry vessels.
Joint Venture	5.5	In terms of upfront payments, the GoU can only be held to its equity contribution. The level of the equity contribution depends on the stake that the GoU holds in the JV. No further availability payments or other payments are required.
DBFM	3.5	In the DBFM model, the GoU has no upfront payments. However, substantial availability payments are required to reimburse the private party for the upfront investments and operational costs.
GoU Control		
Management Contract	3.5	Under the management contract structure, the public party can effectively direct the activities, as it owns the assets and only leverages the private sector operational expertise through the provided labour force.
Joint Venture	3.5	In a Joint Venture, the decision power of the GoU depends on its stake in the JV. However, even with a small stake, JVs provide substantial control options.
DBFM	3.0	DBFM contracts typically entail substantial monitoring and control options for the public party.
Strategic Fit		
Management Contract	4.0	The management contract allocates market risk to the public party. As it is unlikely that the revenues generated from the ferry services are sufficient to cover the costs, a model that allocates market risk to the public party is preferred.

Model	Score	Justification
Joint Venture	1.0	Under a Joint Venture structure, the private party is exposed to a substantial share of the market risk (its share of market risk is equal to its equity stake in the joint operating company, assuming that the public and private parties participate in the entity through provision of funds).
DBFM	5.0	Similar to the management contract, the DBFM model allocates market risk to the public party. However, technical risk (e.g., risk of ferry breakdowns) is often allocated to the private party, as availability payments are reduced if the services cannot be provided (made available). In contrast, this technical risk is typically not fully allocated to the private party under a management contract. As it is assumed that a private party with technical expertise can better manage the technical risk, allocation of the technical risk to the private party is considered suitable for the envisioned landing site and ferry service development.
Ease of Implementation		
Management Contract	4.5	Management contracts are typically very "light" and short-term contracts, making procurement and contracting less complex than with other PPP options. Additionally, management contracts are typically less complex during the operations phase.
Joint Venture	3.0	Establishing a JV entity may be less complex than the procurement and contracting entailed in the DBFM model; operations under JV can be complex, due to the comprehensive involvement of parties in a JV.
DBFM	2.5	Long and complex operator procurement phase; comprehensive GoU obligations during operations.
Market Appetite		
Management Contract	5.5	Market appetite is expected to be significant under the management contract model, as the private party is not required to make any investments and does not bear any market risk.
Joint Venture	1.0	The GoU equity stake in the joint entity signals strong commitment from the GoU and reduces capital requirements from the private sector, resulting in a substantial market appetite.
DBFM	3.5	Under the DBFM structure, the operator is fully reimbursed for its costs, irrespective of realised revenues (it is noted that penalties to the operator may apply if the services cannot be provided due to technical issues, as the technical risk is typically still allocated to the private party in a DBFM contract). Hence, market appetite will be high if the project is implemented as a DBFM.
Value Maximisation		
Management Contract	2.0	The management contract model offers minimal knowledge transfer possibilities. Additionally, the private sector expertise is only partially leveraged, as only operational (and some minimal technical) aspects of the projects are allocated to the private party.
Joint Venture	4.5	Intensive cooperation in the joint entity results in substantial knowledge transfer opportunities. Additionally, the private sector knowledge can be efficiently leveraged under a JV agreement.
DBFM	3.5	The private sector knowledge can be efficiently leveraged under a DBFM agreement. However, knowledge transfer opportunities are limited.

The table below summarises the weighted scores. From the scores, it is concluded that the DBFM is the preferred implementation structure for the landing site and ferry service development activities.

Table 10-8 Influence Area B - PPP MCA Score Summary

	Management Contract	Joint Venture	DBFM	*Total*
GoU Investments (0.2)	1.0	5.5	3.5	*10.0*
GoU Control (0.2)	3.5	3.5	3.0	*10.0*
Strategic Fit (0.1)	4.0	1.0	5.0	*10.0*
Ease of Implementation (0.1)	4.5	3.0	2.5	*10.0*
Market Appetite (0.2)	5.5	1.0	3.5	*10.0*
Value Maximization (0.2)	2.0	4.5	3.5	*10.0*
Total (Weighted)	**3.3**	**3.3**	**3.5**	***10.0***

10.2.3 Port Bell and Jinja Port Operations under a Landlord Structure

The Port Bell and Jinja ports are to be developed as landlord ports, as prescribed in the ToR. As such, no MCA will be carried out for the port operations.

11 Value for Money Analysis

11.1 Introduction

This chapter presents the Value for Money (VfM) analysis for the three Project Areas in the Lake Victoria Transport Program. The VfM analysis is a quantitative analysis of the difference in value between public development and operations and private development and/or operations for each respective project area. In the previous chapter, we have identified the most optimal PPP structure for each respective project area. The VfM analysis presented in this chapter shows whether or not the optimal PPP structure is expected to create more value than the Public Sector Comparator.

The PPP structures as identified in the previous chapter are:

- Project Area A - Freight vessel operations: Joint Venture Model;
- Project Area B - Ferry vessel operations: DBFM Model; and
- Project Area C - Port Bell & Jinja Pier operations: Landlord Model.

11.2 Area A - Freight vessel operations

11.2.1 Main Assumptions

This section defines the Public Sector Comparator and the PPP model (i.e. JV Model) for Project Area A - Freight vessel operations. It describes which activity is allocated to the public or the private party, presents the drivers of the difference in project value and calculates the project value of the PSC.

In the PSC, all activities are allocated to the public party. In the Joint Venture model, all activities are allocated to a Joint Venture, in which both the public party and private operators hold a stake. This implies that investments, as well as profits (or losses), are distributed between the public party and the private sector.

Elements that have been included in this Value for Money analysis are the following.

- **Fleet acquisition**
  The private sector is expected to acquire the same fleet at a lower cost, as it is expected to have negotiation power; a superior understanding of the vessels market; and disciplinary workings of private funding.
- **Operational efficiency**
  The private sector is expected to manage and operate the freight vessels more efficiently than the public sector; and to prevent unforeseen operational issues by means of scheduled and regular maintenance.
- **Labour costs**
  The private sector is expected to have more operational experience and therefore be able to execute the same operations with less employees, although labour costs per employee are expected to be higher.
- **Other operational expenditures**
  The private sector is expected to be more efficient in overall operations, including general process management and overhead costs.

What has not been included in this Value for Money analysis is private funding, as it is assumed to not have an impact on the project. The cost of capital is typically higher in a PPP option, as the public sector typically has access to cheaper funding. However, this is assumed to not be the case for Uganda given its unfavourable credit rating (source: S&P and Moody's).

It is clear that the private sector has an advantage over the public sector on all elements. The magnitude of this advantage, however, is challenging to estimate accurately. We assume the private sector advantage to be 10% on all elements. The purpose of the Value for Money analysis is to present the sensitivity of the business case to allocation of responsibilities to the public sector or private sector respectively. The following table presents the allocation of activities and the private sector advantage in the recommended PPP structure (i.e. Joint Venture model) vis-à-vis the public sector comparator (PSC).

Table 11-1 Allocation of responsibilities and private sector advantage

	Private sector advantage	PSC		Joint Venture	
		Public	Private	Public	Private*
Capital expenditures					
Fleet acquisition	10%	x			x
Operational expenditures					
Fuel & lubricants	10%	x			x
Labour	10%	x			x
Maintenance and insurance	10%	x			x
Overhead	10%	x			x

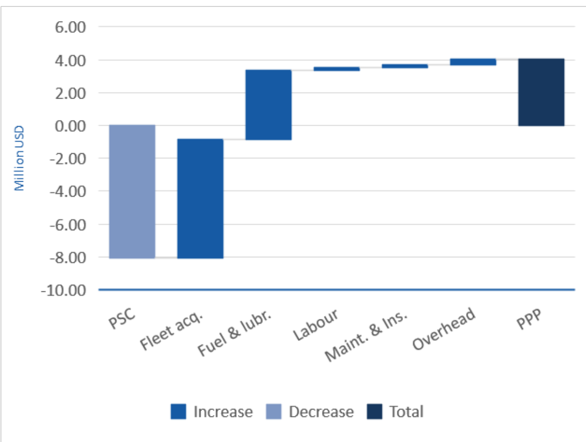
*) The private party is in the lead as major stakeholder, and therefore private sector efficiency gains are applied in the JV structure. In this JV, distribution of investments and free cash flow is 90/10 between private and public sector respectively.

11.2.2 Results of the VfM analysis

The VfM analysis of the freight vessel operations, as presented in Figure 11.1, shows that the PPP model (i.e. JV model) is the preferred model over the Public Sector Comparator, which was to be expected concluding from the previous section. The NPV of the JV Model is based on the inputs as discussed in the Project Business Case, and therefore has the same NPV as the Project Business Case by definition. The NPV of the PSC follows from subtracting all private sector advantage elements. The PSC yields a negative NPV. Biggest driver of the difference in the JV model and the PSC is the fleet acquisition. The results of the VfM analysis imply that the public sector should opt for the implementation of the JV Model (PPP structure).

The results of the VfM analysis for the freight vessel operations are presented in the following figure and table.

Figure 11.1 Value for Money results for Project Area A - Freight vessel operations



Component	Private sector advantage	NPV (USD)
PPP		4,008,783
Fleet acquisition	10%	(7,245,163)
Fuel & lubricants	10%	(4,167,115)
Labour	10%	(164,969)
Maintenance and insurance	10%	(210,488)
Overhead	10%	(300,570)
PSC		(8,079,523)
VfM Delta		**(12,088,306)**

11.2.3 Financial analysis

The following table presents a comparative analysis of financial indicators, along with the project NPV. This analysis includes a break-down between the public sector and the private operator. As the preferred PPP structure entails a JV Model, the cash flows are distributed to the public sector and the private operator. The difference in project NPV between the PSC and the PPP option is driven by the private sector advantage elements as covered in the previous section. The PPP option implies a favourable delta in funding requirement of 76.4 M USD for the public sector, and a positive public sector NPV.

Table 11-2 Financial analysis of the freight vessel operations

	Project (i.e. JV structure)	Public sector (10% stake)	Private operator (90% stake)
PSC			
NPV (USD)	(8,079,523)	(8,079,523)	-
IRR	11.42%	11.42%	-
Payback period	2029	2029	-
Funding requirement (USD)	83,604,886	83,604,886	-
PPP option			
NPV (USD)	4,008,783	400,878	3,607,904
IRR	13.85%	13.85%	13.85%
Payback period	2028	2,028	2,028
Funding requirement (USD)	71,876,794	7,187,679	64,689,115

11.3 Area B - Ferry services

11.3.1 Main assumptions

This section defines the Public Sector Comparator and the preferred PPP model (i.e. DBFM model) for Project Area B - Ferry services. It describes which activity is allocated to the public or the private party, presents the drivers of the difference in project value and calculates the project value of the PSC.

In the PSC, all activities are allocated to the public party. In the DBFM model, responsibilities of capex and opex are allocated to the private operator. As mentioned before in the Project Business Case, the ferry services project will not be financially feasible without gap funding by the public sector. This will be discussed further in detail in this section.

Elements that have been included in this Value for Money analysis are the following.

- **Fleet acquisition and landing site development**
  The private sector is expected to acquire the same fleet at a lower cost, as it is expected to have negotiation power; a superior understanding of the vessels market; and disciplinary workings of private funding. Landing site development has been included in the responsibilities of the private operator, as to adapt and benefit from the operator's expertise. This also contributes to the ease of implementation of the project.
- **Operational efficiency**
  The private sector is expected to manage and operate the ferry vessels more efficiently than the public sector; and to prevent unforeseen operational issues by means of scheduled and regular maintenance.
- **Labour costs**
  The private sector is expected to have more operational experience and therefore be able to execute the same operations with less employees, although labour costs per employee are expected to be higher.
- **Other operational expenditures**
  The private sector is expected to be more efficient in overall operations, including general process management and overhead costs.

What has not been included in this Value for Money analysis is private funding, as it is assumed to not have an impact on the project. The cost of capital is typically higher in a PPP option, as the public sector typically has access to cheaper funding. However, this is assumed to not be the case for Uganda given its unfavourable credit rating (source: S&P and Moody's).

It is clear that the private sector has an advantage over the public sector on all elements. The magnitude of this advantage, however, is challenging to estimate accurately. We assume the private sector advantage to be 10% on all elements. The purpose of the Value for analysis is to present the sensitivity of the business case to allocation of responsibilities to the public sector or private sector respectively. The following table presents the allocation of activities and the private sector advantage in the recommended PPP structure (i.e. Joint Venture model) vis-à-vis the public sector comparator (PSC).

The table on the next page presents the allocation of activities and the private sector advantage vis-à-vis the public sector comparator.

Table 11-3 Allocation of responsibilities and private sector advantage

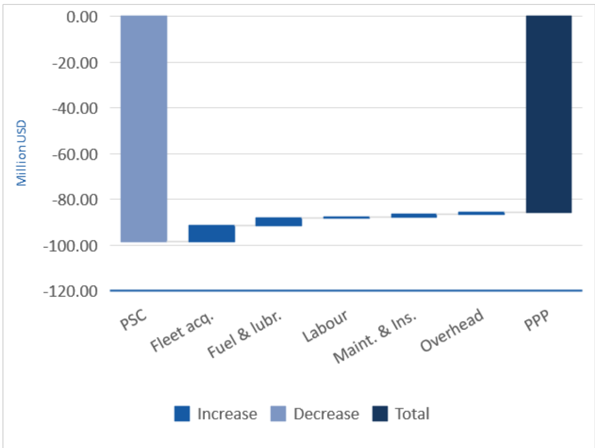
	Private sector advantage	PSC		DBFM	
		Public	Private	Public	Private*
Capital expenditures					
Fleet acquisition and landing site development	10%	x			x
Operational expenditures					
Fuel & lubricants	10%	x			x
Labour	10%	x			x
Maintenance and insurance	10%	x			x
Overhead	10%	x			x

11.3.2 Results of the VfM Analysis

The VfM analysis of the ferry vessel operations as presented in Figure 11.2, shows that the PPP model (i.e. DBFM model) is the preferred model over the Public Sector Comparator, which was to be expected concluding from the previous section. However, neither of the models yield a positive NPV. The NPV of the DBFM model is based on the inputs as discussed in the Project Business Case, and therefore has the same NPV as the Project Business Case by definition. The NPV of the PSC follows from subtracting all private sector advantage elements. The positive impact of the DBFM model over the PSC is relatively small compared with the NPVs of the two options. The results of the VfM analysis imply that gap funding is required regardless of which option is selected, however the DBFM model will be favourable as gap funding is lower.

The results of the VfM analysis for the ferry vessel operations are presented in the following figure and table.

Figure 11.2 Value for Money results



Component	Private sector advantage	NPV (USD)
PPP		(85,899,812)
Fleet acquisition	10%	(6,964,353)
Fuel & lubricants	10%	(3,463,266)
Labour	10%	(435,672)
Maintenance and insurance	10%	(1,158,575)
Overhead	10%	(581,749)
PSC		(98,503,427)
VfM Delta		**(12,603,615)**

11.3.3 Financial analysis

The following two tables present a comparative analysis of financial indicators for the PSC, the DBFM model, without and with the gap funding. For sake of completeness, Table 11-4 shows the need for gap funding, regardless whether public sector operations or private operations is selected.

Table 11-4 Financial analysis of the ferry vessel operations without gap funding

	Project	Public sector	Private operator
PSC			
NPV (USD)	(103,758,214)	(103,758,214)	-
IRR	n/a	n/a	-
Payback period	n/a	n/a	-
Funding requirement (USD)	245,186,550	245,186,550	-
PV of Gap funding (USD)	-	-	-
PPP option			
NPV (USD)	(85,899,812)	-	(85,899,812)
IRR	n/a	-	n/a
Payback period	n/a	-	n/a
Funding requirement (USD)	193,975,478	-	193,975,478
PV of Gap funding (USD)	-	-	-

Table 11-5 shows that the PPP option (DBFM model) requires less gap funding, as it has private sector advantage elements that were discussed in the previous section. The DBFM model is selected above public operations, as it reduces the funding requirement for this project from 210 M USD to 106 M USD.

Table 11-5 Financial analysis of the ferry vessel operations with gap funding

	Project	Public sector	Private operator
PSC			
NPV (USD)	-	-	-
IRR	13.00%	13.00%	-
Payback period	2028	2028	-
Funding requirement (USD)	92,916,838	92,916,838	-
PV of Gap funding (USD)	125,224,562	125,224,562	-
PPP option			
NPV (USD)	0	(85,899,812)	0
IRR	13.00%	-	13.00%
Payback period (USD)	2028	-	2028
Funding requirement (USD)	80,797,250	-	80,797,250
PV of Gap funding (USD)	106,020,608	(85,899,812)	-

11.4 Area C - Port Bell & Jinja Pier Operations

11.4.1 Main assumptions

This section defines the Public Sector Comparator and the PPP model (i.e. Landlord model) for Project Area C - Port Bell & Jinja Pier operations. The Port Bell and Jinja ports are to be developed as landlord ports, as prescribed in the ToR. The aim of the VfM analysis is to show the added value of this decision compared vis-à-vis a Private Sector Comparator.

In the PSC, all activities are allocated to the public party. In the Landlord model, responsibilities of opex are allocated to the private operator. Responsibilities of capex are divided between the landlord and the private operator, depending on the nature of the project. In this case, it is recommended all capex is carried out by the private operator for reasons explained under the first bullet below.

Elements that have been included in this Value for Money analysis are the following.

- **Infrastructure and superstructure rehabilitation**
  The private sector is expected to rehabilitate the ports at a lower cost, as it is expected to have negotiation power; a superior understanding of the industry; and disciplinary workings of private funding.
- **Operational efficiency**
  The private sector is expected to manage and operate the ports more efficiently than the public sector; and to prevent unforeseen operational issues by means of scheduled and regular maintenance.
- **Labour costs**
  The private sector is expected to have more operational experience and therefore be able to execute the same operations with less employees, although labour costs per employee are expected to be higher.
- **Other operational expenditures**
  The private sector is expected to be more efficient in overall operations, including general process management and overhead costs.

What has not been included in this Value for Money analysis is private funding, as it is assumed to not have an impact on the project. The cost of capital is typically higher in a PPP option, as the public sector typically has access to cheaper funding. However, this is assumed to not be the case for Uganda given its unfavourable credit rating (source: S&P and Moody's).

The following table presents the allocation of activities and the private sector advantage vis-à-vis the public sector comparator.

It is clear that the private sector has an advantage over the public sector on all elements. The magnitude of this advantage, however, is challenging to estimate accurately. We assume the private sector advantage to be 10% on all elements. The purpose of the Value for Money analysis is to present the sensitivity of the business case to allocation of responsibilities to the public sector or private sector respectively. The following table presents the allocation of activities and the private sector advantage in the recommended PPP structure (i.e. Landlord model) vis-à-vis the public sector comparator (PSC).

Table 11-6 Allocation of responsibilities and private sector advantage

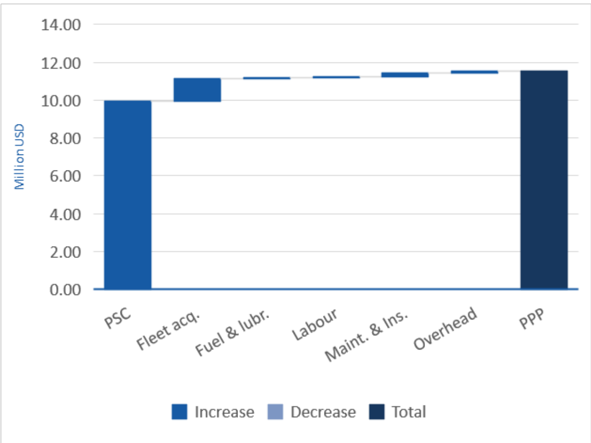
	Private sector advantage	PSC		Landlord model	
		Public	Private	Public	Private*
Capital expenditures					
Fleet acquisition	10%	x			x
Operational expenditures	10%				
Fuel & lubricants	10%	x			x
Labour	10%	x			x
Maintenance and insurance	10%	x			x
Overhead	10%	x			x

11.4.2 Results of the VfM Analysis

The VfM analysis of the port operations as presented in the following table shows that the PPP model (i.e. Landlord model) is the preferred model over the Public Sector Comparator, which was to be expected concluding from the previous section. However neither of the models yield a positive NPV. The NPV of the Landlord model is based on the inputs as discussed in the Project Business Case, and therefore has the same NPV as the Project Business Case by definition. The NPV of the PSC follows from subtracting all private sector advantage elements. The positive impact of the Landlord model over the PSC is relatively small compared with the NPVs of the two options. Important to note here, is that this concerns the project NPV of Port Bell and Jinja Pier. There are substantial differences in NPV for the two subprojects separately, as has been presented in the Project Business Case.

The results of the VfM analysis for the ferry vessel operations are presented in the following figure and table.

Figure 11.3 Value for Money results



Component	Private sector advantage	Value
PPP		11,539,308
Capex	10%	(1,198,482)
Fuel & lubricants	10%	(13,781)
Labour	10%	(54,710)
Maintenance and insurance	10%	(191,205)
Overhead	10%	(128,810)
PSC		9,952,320
VfM Delta		**(1,586,988)**

11.4.3 Financial analysis

The following tables present the financial indicators, including the NPV of the project, for the PSC and the PPP structure (i.e. Landlord model). In a competitive environment, private bidders will bid to operate the ports at an NPV of zero. This implies the Landlord can charge concession fees with a present value of maximum 11.5 M USD, as presented in Table 11-8.

Table 11-7 Financial analysis of the port operations without concession fees

	Project (i.e. JV structure)	Public sector	Private operator
PSC			
NPV (USD)	9,042,452	9,042,452	-
IRR	22.94%	22.94%	-
Payback period	2024	2024	-
Funding requirement (USD)	14,230,100	14,230,100	-
PPP option			
NPV (USD)	11,539,308	-	11,539,308
IRR	27.18%	-	27.18%
Payback period	2024	-	2024
Funding requirement (USD)	12,374,000	-	12,374,000

Table 11-8 Financial analysis of the port operations with concession fees

	Project (i.e. JV structure)	Public sector	Private operator
PPP option			
NPV (USD)	-	11,539,308	-
IRR	13.00%	-	13.00%
Payback period	2027	-	2027
Funding requirement (USD)	12,374,000	-	12,374,000
PV of concession fees		11,539,308	(11,539,308)

12 Way Forward

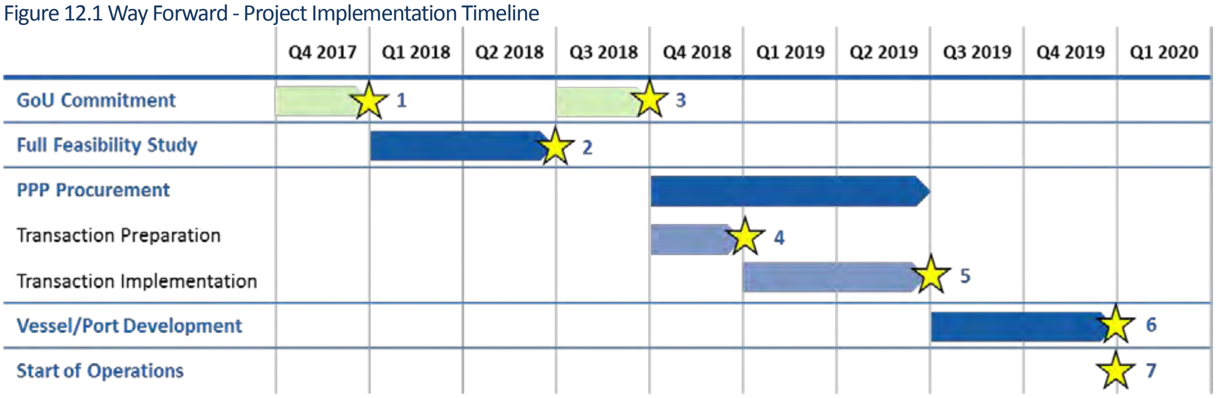
In this section, the way forward is outlined for each of the envisioned lake transport projects. As part of the way forward, the following topics are discussed:

- Implementation timelines and milestones for each of the projects, including follow up studies and procurement processes.
- Risks

Implementation Timeline

For all 3 projects, a similar timeline is foreseen. This general timeline is visualised in Figure 12.1.

Figure 12.1 Way Forward - Project Implementation Timeline



In the timeline, the following 7 major milestones are identified:

- Milestone 1: Initial GoU Commitment – After the completion of the Due Diligence Study, the GoU should assess whether it wants to move on with the individual projects. This process is similar for each of the envisioned Lake Victoria transport projects.
- Milestone 2: Completion of Full-fledged Feasibility – If the GoU decides to move on with one or more of the projects, more detailed feasibility studies need to be carried out. Among others, the following studies will need to be carried out to move forward with each of the projects:
  - Influence Area A (Cargo Shipping Services)
    - Detailed vessel design
    - Detailed financial assessment
    - Full Environmental and Social Impact study
  - Influence Area B
    - Bathymetric surveys
    - Detailed vessel design
    - Detailed landing site design
    - Detailed land ownership study
    - Detailed financial assessment
    - Full Environmental and Social Impact Study
  - Influence Area C
    - Detailed financial assessment
    - Full Environmental and Social Impact Study
    - Detailed technical (land and marine) surveys

- Milestone 3: Final GoU Commitment – Following the detailed feasibility studies, a complete overview of the impact of the projects should be available to the GoU. As such, the GoU can now make a fully informed decision whether or not to move the projects to implementation.
- Milestone 4: Transaction Strategy – From the transaction preparation, the optimal transaction strategy for each of the envisioned projects needs to be determined. Inter alia, the following characteristics of the transaction strategy may vary between projects:
  - 1-stage or 2-stage tender: the GoU needs to decide whether a 1-stage (Request for Proposal) tender or a 2-stage (Request for Expression of Interest and Request for Proposal) should be employed for each of the projects. Typically, a 2-stage tender is used when the expected number of bidders is substantial, as it enables the Executing Agency to time-efficiently "filter" out several high-potential bidders.
  - Number of market soundings: a market sounding may have several goals. Typically, a market sounding is employed to market a project and boost investment appetite among private parties. Such a market sounding is usually placed relatively late in the project implementation process, when all information is available. However, market soundings can also be used to involve the private sector in optimising the scope of an envisioned project; in such a case, the market sounding is typically placed earlier on in the implementation process.
- Milestone 5: Following the procurement process, the following key agreements should be in place:
  - Influence Area A
    - Shareholders agreement with the selected Joint Venture (JV) partner(s)
    - A vessel construction contract should follow immediately after the selection of the JV partner. The vessel construction contract is signed at the JV level, including the GoU and its JV partner(s).
    - Required licences to operate shipping services on the lake.
  - Influence Area B
    - DBFMo contracts with the selected private operators for each of the identified lots.
    - Similar to Influence Area A, vessel and landing site construction contracts should follow shortly after the selection of the operators. These construction contracts are to be arranged by the selected operators.
    - Required licences for the operate to provide the ferry services.
  - Influence Area C
    - Landlord PPP agreement with the preferred bidder.
    - Preferably, the contractor procurement for the port construction works is carried out simultaneously to the operator procurement, in order optimise the implementation timeline and reducing risks related to committing to port construction works without having an agreement with an operator in place.
- Milestone 6: Handover of Assets – completion of port and vessel construction.
- Milestone 7: Start of Operations – Following the handover of the assets, operations of the projects can commence.

It is noted that the steps after milestone 3 are only undertaken for the project(s) that the GoU decides to implement at the Final Commitment stage.

Risks

The table below provides an overview of several key risks that need to be considered for the implementation of the envisioned projects.

Table 12-1 Key Risks

Topic	Risk	Result
Technical Risk	Construction delay	Increased construction costs; delayed operations
Legal Risk	Land ownership issues	Prohibition of landing site developments at selected locations
Legal Risk	Environmental issues	Inability to obtain required licences to move forward with implementation
Legal Risk	PPP contracts are inadequate	Difficult to efficiently monitor and control PPP projects
Commercial Risk	Inability to find suited operator	Delayed operations; less efficient operations
Institutional Risk	GoU decision delay	Delayed operations
Financial Risk	Funding requirement is too high	Low market appetite; inability to find suitable operators

Appendix I Influence Areas

Influence Area A – Point to Point Cargo Services Across the Lake

The first scope has the lowest zoom level, focusing on the international trade lanes on Lake Victoria. The main focus will be on the trade lanes between (i) Port Bell and Mwanza; (ii) Port Bell and Kisumu; (iii) Jinja and Mwanza; and (iv) Jinja and Kisumu. For this focus area, the project activities aim to identify the optimal vessel fleet, and assess the feasibility for private sector involvement in the operation of this vessel fleet.

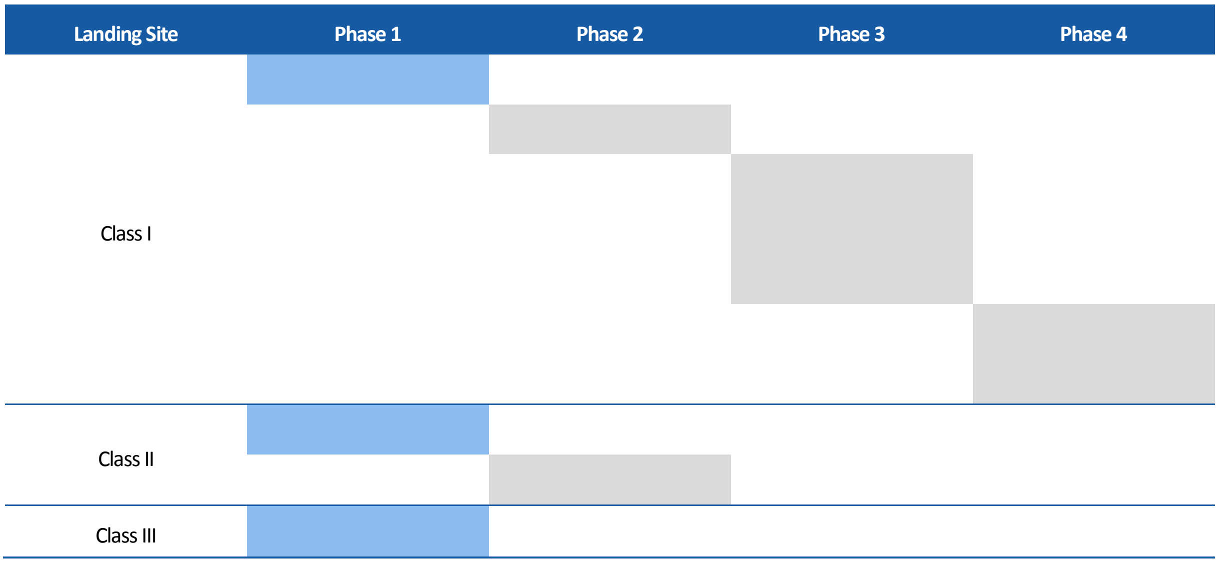
Besides these identified focus ports and trade routes, the Due Diligence will assess the impact of other current ports (e.g., Bukoba) and proposed future developments (e.g., Bukasa and Lukaya) on the Lake Victoria transport system and on the demand and development requirements of Jinja and Port Bell in specific. However, no investment plans are to be prepared regarding these non-key trade ports.

Influence Area B – Lake Victoria Passenger Ferry Services

The second scope has a medium zoom, focusing on the transport between lakeside locations and islands in Uganda. It is acknowledged that many landing sites, with varying sizes and importance, are currently operated (a long list of landing sites has been provided to the Consultant by the MoWT). For the purpose of identifying key landing sites, the sites will be allocated to the following 3 classifications (using the assessment template data obtained from the MoWT):

- Class I – Cultivated Beach Area
- Class II – Small Jetty / RoRo Facility
- Class III – Port

In order to enable a viable development and swift implementation of the envisioned lake transport system, the initial focus should be on key landing sites and routes. Following these 'pilot' routes, the lake transport systems can be gradually developed further. A high-level schematic approach of this lake transport implementation is presented below.

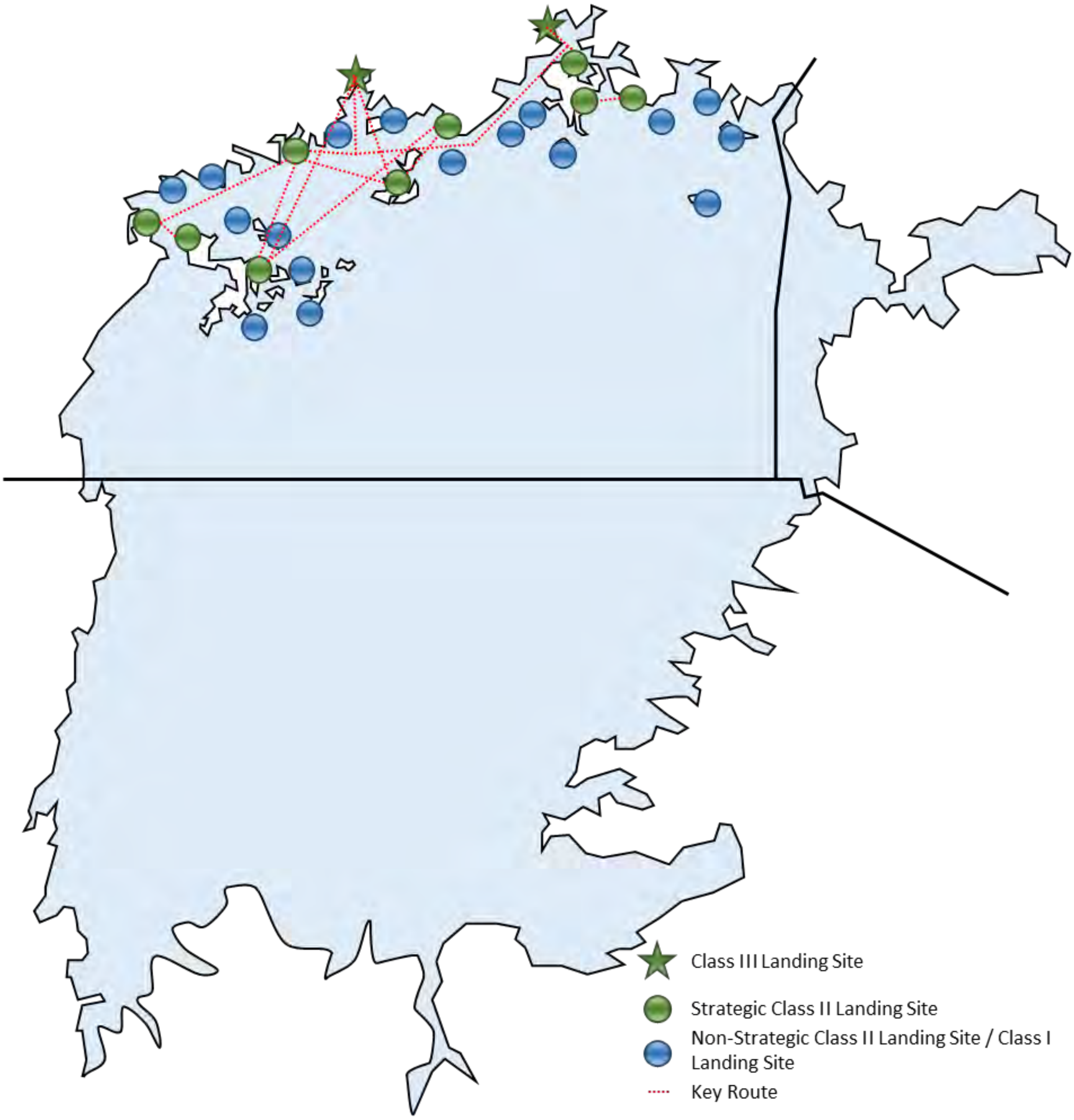


*Blue cells refer to key focus areas of this assignment; grey cells refer to focus areas of later implementation phases.

As such, the pilot ferry services should focus on connecting Class II and Class III landing sites, as these landing sites already have basic required infrastructure (only some rehabilitation or upgrade works may be required); due to existing infrastructure, services that make use of Class II and Class III landing sites can be implemented rapidly and at a lesser cost.

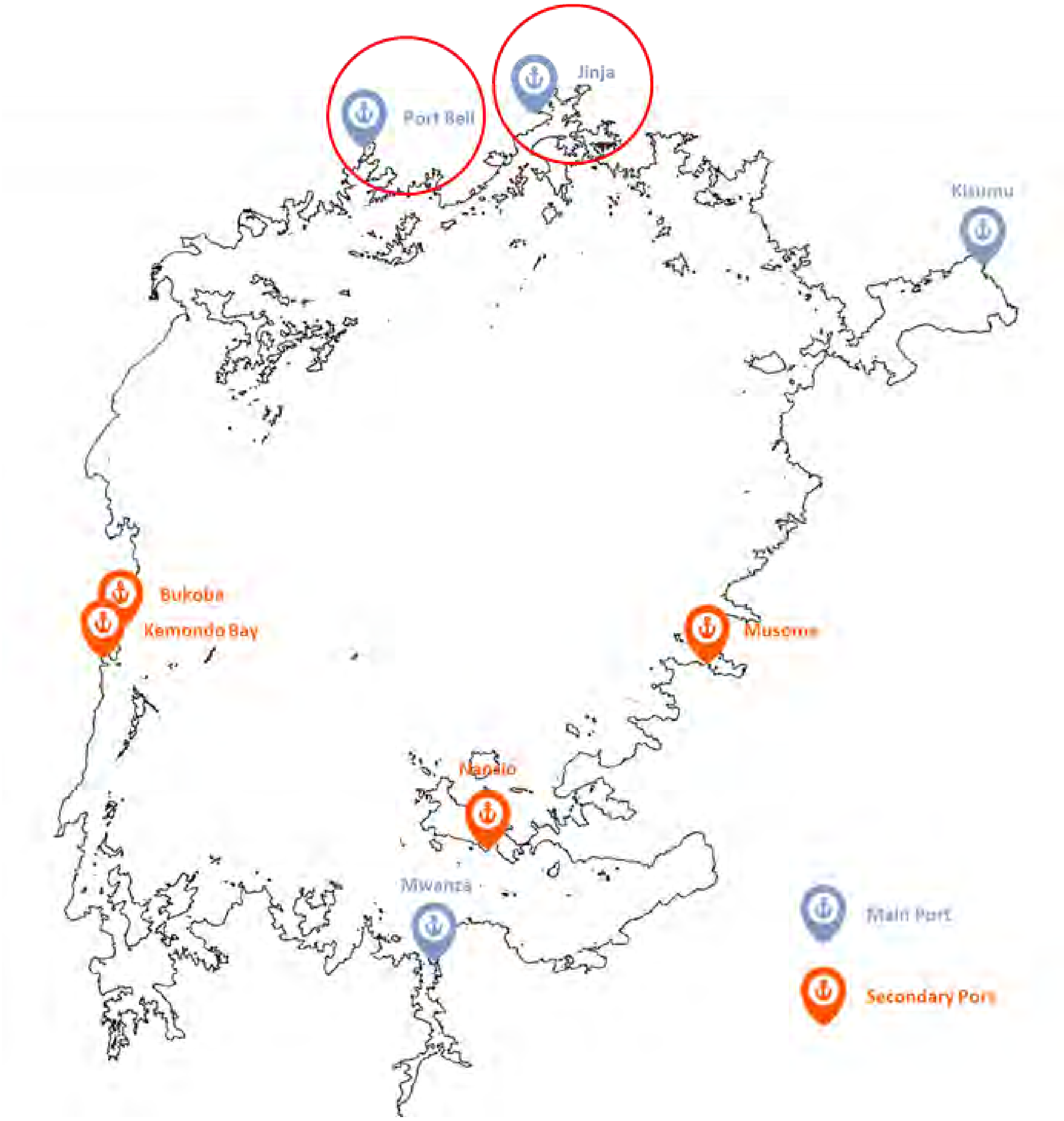
However, some Class I landing sites will need to be connected, as the ferry services are aimed at connecting the Lake Victoria islands to the mainland, and the majority of islands on Lake Victoria do not possess Class II or Class III landing sites. As such, several (strategically positioned) Class I landing sites may be included in the assessment.

The figure below provides a schematic indication of Influence Area B



Influence Area C – Landlord Port Operations of Port Bell and Jinja Pier

The third project focus has the highest zoom level, focusing solely on the development and institutional setting of the Port Bell and Jinja ports. The figure below visualizes the third project focus area.



Appendix II Sea Port Descriptions

Port of Mombasa - Kenya

Introduction

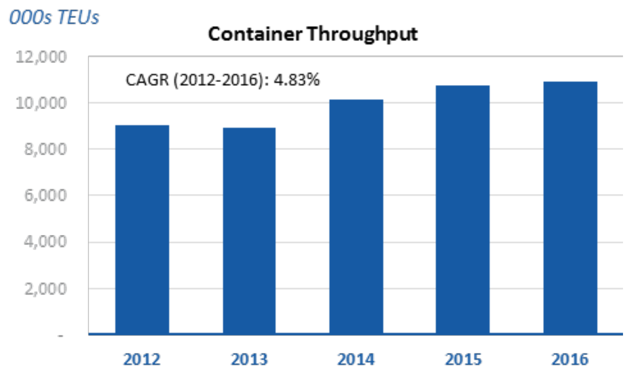
The Port of Mombasa is Kenya's primary port and the main gateway and exit port for cargo belonging to a large hinterland that includes the landlocked countries of Uganda, northern Tanzania, Burundi, Rwanda, South Sudan, and the eastern regions of the DRC. Using a regular feeder system, the port is connected to Mogadishu, Dar es Salaam, and transhipment hubs such as Djibouti, Durban, and Salalah. The port is home to two container terminals: The Mombasa Container Terminal and the newly constructed Kipevu Container Terminal, which was commissioned in March 2016 and has a yearly handling capacity of 550,000 TEU in Phase I. The port of Mombasa is connected via "The Northern Corridor" road network to its hinterland markets, though current road conditions highlight the need for quality improvements. The recently inaugurated Standard Gauge Railway (SGR) connects the port of Mombasa via rail to Nairobi, and is to be further extended to Kisumu and Malaba. These projects highlight the Government of Kenya's strong interest in modernisation and physical expansion of the transport sector.

Management and Ownership

The Kenya Ports Authority is the sole operator in the port of Mombasa, however has the ambition to become a landlord port authority, overseeing private concessionaires. Though Phase I of the new Kipevu Container Terminal has already been commissioned, private port operators have not yet been contracted. Phase 2 and 3 of the Kipevu terminal are expected to be completed in 2017 and 2020 respectively.

	2012	2013	2014	2015	2016
Containers (TEU)	903	894	1,012	1,076	1,091
Containers (tons)*	9,035	8,940	10,120	10,761	10,910
General Cargo (tons)	1,455	1,854	1,938	2,256	2,310
Dry Bulk (tons)	4,917	4,978	5,653	6,928	7,094
Liquid Bulk (tons)	6,825	6,637	7,237	7,272	7,447
Vehicles (tons)	180	205	237	216	221
Total	**22,412**	**22,614**	**25,185**	**27,433**	**27,982**

Source: Kenya Port Authority; Unit: 000s; *estimated



Port of Dar es Salaam - Tanzania

Introduction

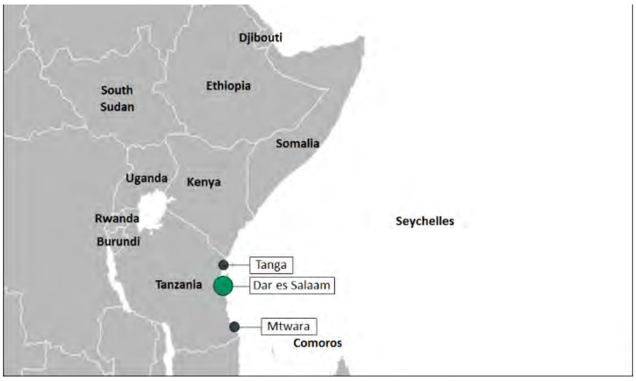
The port of Dar es Salaam is located on the coast of the Indian Ocean. It is the former capital of Tanzania, and still the largest city of Tanzania. The port of Dar es Salaam is the most important port of Tanzania, as it handles about 95% of Tanzania's international trade. The port of Dar es Salaam is not only important for Tanzania, but also to the landlocked countries of Malawi, Zambia, DRC, Burundi, and Rwanda, as the port functions as a gateway to these countries. Due to its function as a transit port, it is import-oriented.

Port Authority and PPP

The port authority of the port of Dar es Salaam is the Tanzania Ports Authority (TPA). The container terminal in the port is operated by the Tanzania International Container Terminal Services (TICTS). TICTS is owned for 70% by Hutchison Port Holdings (HPH), with the Harbours Investment Ltd of Tanzania holding the remaining 30%. TICTS was awarded a 10-year concession in 2000 to operate the Dar es Salaam container terminal. The contract was subsequently extended to 2025 in 2005. Recently, the contract was again renegotiated.

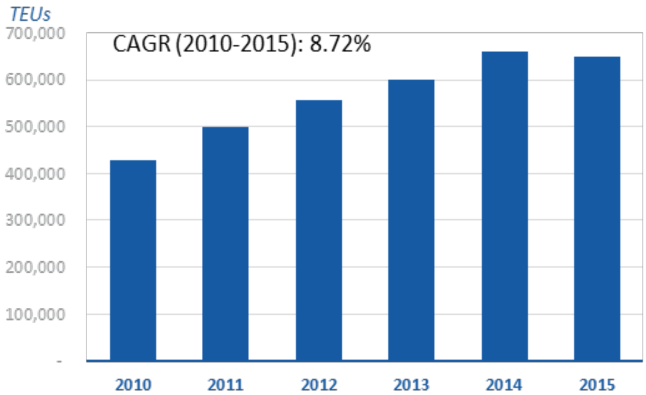
Container Throughput and Capacity

The total container throughput in the port of Dar es Salaam increased from 428,000 TEU in 2010 to 651,000 TEU in 2015 (CAGR: 8.7%). Container traffic showed a decline in 2016 to 623,000 TEU. The total container capacity in the port is estimated at 600,000 TEU (TICTS).



	2012	2013	2014	2015	2016
Containers (TEU)	558	600	661	651	
General Cargo (tons)	291	492			
Dry Bulk (tons)	1,596	1,955			
Liquid Bulk (tons)	3,983	4,789	4,821	4,806	
Vehicles (tons)	245	253			
Total	**11,963**	**11,379**	**13,311**	**14,260**	**13,300**

Source: Tanzania Ports Authority; Unit: 000s



Appendix III Description of Lake Ports

Jinja, Uganda	

Quay length	60m x 15m
Yard area	Approximately 0.25 ha
Institutional structure	Assets belong to URC; operations are carried out by the Rift Valley Railways (RVR)
Port area	-
Lake connectivity	Water depth of -4m CD; the port can handle vessels up to 500 GRT
Land connectivity	The port has a rail connection to the Northern corridor, but the rail link between the port of Jinja and the local ICD (3 km away) has a 3 percent slope and is in a poor condition[5]. Additionally, the rail tracks that connect the port to the city have been removed by local communities and vandalism. The dirt road running down to the port of Jinja is steeply graded and heavily crevassed[6].
Equipment	A slipway (overgrown with plants) Oil loading pipeline at jetty and pump facility is not functional
Superstructures	Dolphin mooring system that requires an overhaul. Roll-on Roll-off (RoRo) rail wagon loading dock (link-span)
State of infrastructure	It is in very poor condition with most of the planking and fendering systems decayed beyond use[7]. The rail connection with the main line is not functional due to missing tracks in the city area
IT and communication system	-
Traffic	-
Other comments	Mainly used as a relief port for Port Bell when it was congested.

[5] Corridor Diagnostic Study of the Northern and Central Corridors of East Africa, Nathan Associates, 2011

[6] Corridor Diagnostic Study of the Northern and Central Corridors of East Africa, Nathan Associates, 2011

[7] Corridor Diagnostic Study of the Northern and Central Corridors of East Africa, Nathan Associates, 2011

Port Bell, Uganda

Quay length	85m x 50m
Yard area	The yard can hold up to 130 rail wagons
Institutional structure	Owned and operated by the Rift Valley Railways (RVR)
Port area	1 ha + 0.5 ha rail marshalling yard
Lake connectivity	The port is located at the end of a narrow inlet of Lake Victoria; depth alongside the pier and berth is between CD -3.5m and CD -4m (used to be up to CD -6m)
Land connectivity	The port has a direct rail link to the Kampala main station; however, the rail track is derelict and encroached. A marshalling yard with 4 tracks is located along the access to the port.
Equipment	• One operating mobile crane • Load-on Load-off (LoLo) facilities for cargo handling • Roll-on Roll-off (RoRo) rail wagon loading dock (link-span)
Superstructures	• Warehouse (75 x 20m) in dilapidated state • Rail ferry wharf (link-span)
State of infrastructure	Rail and road infrastructures in poor but functional state. The port's main problem is a lack of operating space especially for trucks.
IT and communication system	-
Traffic	When it was operated by the Uganda Railways Corporation, the port handled 360,000–400,000 tonnes annually. It is currently handling an average of 60,000 tonnes annually. Ginger accounts for 45% of this total, with remaining items including wheat, cottonseed, cooking oil, rice, and break-bulk consumer goods.
Other comments	A shallow overgrown marsh area adjacent to the rail yard could be reclaimed to create a yard area of about 1 ha.

Mwanza North, Tanzania

Quay length	55m x 22m x 58m; 2 berths
Yard area	1,700m^2 (lake side of the old passenger terminal)
Institutional structure	Operated and maintained by the TPA
Port area	2 Ha
Lake connectivity	Water depth along the quay is approximately -3m CD
Land connectivity	Road and rail connection available
Equipment	There is no cargo handling equipment available, as the terminal mainly handles passengers and small cargoes.
Superstructures	• Regional KPA Office • Passenger Terminal • Bunkering Tanks • RoRo Facilities
State of infrastructure	Relatively good. Parts have been recently paved.
IT and communication system	New inter ports communication system has been implemented. However, limited use of IT systems.
Traffic	The North Port is utilized mainly for passengers, vehicles, and local cargo. Passenger-cargo ships load international cargo at the South Port, and then call at the North Port for passengers.
Other comments	Terminal is situated adjacent private operations.

Mwanza South, Tanzania	
	
Quay length	220m quay length between Link span and floating dock Floating dock II: approx. 100m x 15m (recently rehabilitated) Floating dock I: approx. 50m x 12m Jetty: 70 at South side next to Link span Two tier quay level with a difference of 0.7m in height over a length of 190m hinders efficient operations
Yard area	Apron area: 220m x 12m (2-levels) Current vacant area 1.6 ha can be extended to over 2 hectares, which enables a throughput of approx. 60,000 TEUpa.
Institutional structure	Owned and operated by TPA.
Port area	Approximately 7 Ha; 450m x 150m
Lake connectivity	Water depth alongside the berths is limited.
Land connectivity	Connected to the central railway: trains are received and marshalled at Mwanza South station and dispatched to Mwanza South Port or Mwanza stations. The rail line inside the port is of a poor state, and looped along the main quay, with two spurs, one (disused) running along the cope edge and the other fronting the goods sheds. Wagons can be parked here in readiness for shunting onto ferries through a rail-wagon terminal and located at the southern end of the quay facilities[8].
Equipment	• Weighbridge (recently acquired) • Only 1 jetty crane is operational at a max of 3 tons. • Old crane is out of use • 3 fork lifts have been acquired recently • One farm tractor used for shunting the rail cars on and off the wagon ferry

[8] Land-bridge concept study, RAHCO, 2012

Superstructures	Various sheds and storage area. One storage shed along the quay has been rehabilitated recently. Other structures require maintenance or upgrading.
State of infrastructure	Generally poor. Yard area is not paved and very uneven, and is affected by floods and sand deposition. Railway tracks are also in a dilapidated state. The rail link span is in a fairly good condition.
IT and communication system	New inter-ports communication system has been installed, but use of IT systems is limited.
Traffic	The South Port handles the transport of railway wagons to/from Uganda and Kenya, and local cargo. While local traffic has been steadily increasing up to nearly 300,000 tonnes in 2010, international traffic volumes decreased sharply since 2005, from 375,000 tonnes in 2005 to 50,000 tonnes in 2010[9]. Imports are slightly higher than exports.
Other comments	Limited facilities and space for container handling, but potential areas for expansion: • 200m could provide for approx. 100,000TEUpa capacity (500TEUpa/m) if appropriately upgraded and supplied with equipment. • Potential area for storage: 2 Hectares allows for approx. 60,000TEUpa. With some adjustments, a larger container yard can be developed. When cargo was handled by railway wagon ferries, it reportedly took about 2–3 hours to shunt 19 wagons[10] (2004).

[9] Comprehensive Transport and Trade System Development Master Plan in the United Republic of Tanzania, JICA, 2012

[10] Comprehensive Transport and Trade System Development Master Plan in the United Republic of Tanzania, JICA, 2012

Kisumu, Kenya

Quay length	260m
Yard area	Paved open storage area of approximately 0.3 Ha
Institutional structure	The Kenya Ports Authority (KPA) is mandated to take over the management of the port from the KRC, but the official handover of assets has not yet been completed.
Port area	20 Ha, but KPA area is approximately 6 Ha
Lake connectivity	Water depth along the quay is limited. Additionally, water hyacinth periodically clogs up the port, hampering vessel movements into/out of the port.
Land connectivity	The rail-wagon terminal in the port of Kisumu is connected by a branch rail line connecting to the Northern railway corridor. This rail line also connects the port to the Kisumu ICD, which is situated approximately 3 Km inland from the port. However, the RVR currently offers no rail services to/from Kisumu.
Equipment	There is no cargo handling equipment available; all cargo handling is done manually by local labourers.
Superstructures	• warehouse of 80x16m • paved open storage are of approximately 3,000m² • Kisumu has the most fully equipped machine, carpentry, and fabrication shops of the Lake Victoria ports. The port area also includes a working dry dock of 100 m × 30 m, and a working draft of 6 m. The facility includes two slipways that are able to accommodate vessels of up to 800 tonnes.
State of infrastructure	Pavement and storage sheds are in fair to good condition. The rail link span is currently dysfunctional.
IT and communication system	-
Traffic	Cargo throughput (year unspecified) is limited mainly to local lake trade, with 28,000 tonnes of exports, consisting mainly of petroleum products to Mwanza, Tanzania, and break-bulk cargo including sweets, soap, salt, cooking oil, and stationary and general merchandise, and 8,000 tonnes of imports, consisting mainly of cottonseed cake from Tanzania used for animal feed. Kisumu no longer handles containers.
Other comments	-

Appendix IV Forecast Methodology

Several steps have been followed to develop the traffic model for the EAC region, as presented hereafter.

Transport demand: Origin – Destination matrices
The freight transport demand is modelled using an origin-destination matrix which describes the travel demand between all pairs of origins and destinations in a defined area.

Definition of base year
Considering the availability of data from studies and the secondary existing data sources, the consultant defined 2010 as the base year for developing the current traffic model. Origin-destination matrices determined in the Tanzania Master Plan (JICA) have been used as the key input for the corridor traffic model. Those are the only O-D matrices that are available among the existing studies and policy documents on transport in the EAC region.

Definition of zones
All the origins and destinations in the O-D matrix are represented as zones in the transport model. The zones have been defined in a way that they represent the international traffic in the EAC region, as well as the domestic traffic in Tanzania, Kenya and Uganda.

22 zones have been defined as follows:

Tanzania (8 zones): Arusha; Dar Es Salaam; Dodoma; Bukoba; Kigoma; Musoma; Mwanza; Isaka-Shinyanga (the southern part of Tanzania is included in the external zone in the south of the EAC region)

Kenya (3 zones): Mombasa; Nairobi; Eldoret

Uganda (2 zones): Hoima; Kampala. Therefore the northern part of Uganda is included in the external zone (Gulu) in the north of the EAC region. Albertine region was assigned to Hoima while Pakwach was assigned to Gulu. Traffic assumption related to oil reserves in Albertine is described in the previous report.

Rwanda

Burundi(2 zones): Bujumbura, Musongati (Traffic assumption is developed in the previous report)

External (mixed) zone in the north of the EAC Region: South Sudan, including northern Uganda – Gulu

External (mixed) zone in the south of the EAC Region: remainder of Zambia, Malawi, Mozambique, southern Tanzania and Southern Africa

External zone in the northwest of the EAC Region: DRC-Kivu

External zone in the west of the EAC region: DRC-Kalemie, Zambia-Mpulungu

External zones (rest of the world) (2): Rest of the world through Dar es Salaam, Rest of the world through Mombasa.

The Tanzanian zones are constituted by aggregating regions that are largely accessible in the same way:

Arusha combines Arusha and Kilimanjaro regions;

Dar Es Salaam combines Dar Es Salaam, Pwani and Tanga regions;

Dodoma combines Dodoma, Manyara, Morongo and Singida regions;

Bukoba corresponds to Kagera region;

Kigoma combines Kigoma and Rukwa regions;

Musoma corresponds to Mara region;

Mwanza corresponds to Mwanza region;

Isaka-Shinyanga combines to Tabora and Shinyanga regions;

The external (mixed) region South combines the other regions with various other southern African countries.

All traffic for Kenya has been aggregated around three important centres: Mombasa for eastern Kenya, Nairobi for central Kenya and Eldoret/Kisumu for western Kenya. Northern Kenya has been distributed between these three zones. Between these zones, internal traffic has also been estimated.

Similarly, all traffic for Uganda has been aggregated. Here, we have used Hoima as a centre for the Albertine region, Gulu as a centre for the northern region (which is extrapolated to include South Sudan), and Kampala as a central focal point for activities in the rest of Uganda.

Burundi is split into two main zones (Bujumbura and Musongati due to its natural resources).
Rwanda is represented by one zone. The model does not take into account local transport flows within each zone.
The external zones express the relations of the EAC region with the neighbouring countries and overseas ("rest of the world").

The zones are illustrated in the table below.

	Tanzania	Uganda	Uganda	Burundi	Rwanda	Others
Tanzania	Domestic Traffic					Exports towards Neighboring Countries and Ports
Kenya		Domestic Traffic				
Uganda			Domestic Traffic			
Burundi				Domestic Traffic		
Rwanda						
Others	Imports from Neighboring Countries and Ports					

Construction of the current O-D matrix

The O-D matrix for the base year (2010) represents all the freight transport flows between each pair of origin and destination zones. This has been developed based on data concerning international traffic (Source: Tanzania Master Plan, JICA 2013), domestic traffic (Source: Tanzania Master Plan, JICA 2013) and distances between the different zones, by also performing research in a number of sources (Ports throughputs (TPA), "Tanzania Transport Infrastructures and Demand, IT Transport 2012", "Corridor Diagnostic Study, Nathan Associates, 2011", "Definition and Investment Strategic Transport Network for Eastern and Southern Africa, PPIAF 2011",...).

The construction process of the current O-D matrix has been the following.

Base matrix from JICA (2010 data) which contains some assumptions for international traffic.

The non-EAC countries (DRC, Zambia, Malawi, Mozambique) are split and recombined into 3 new zones, with the following assumptions:

Kivu takes 80% of the DRC traffic, without considering the traffic between DRC and Zambia;

Mpulungu Kalemie (combined into one zone) takes 5% of both DRC and Zambia traffic, without considering the traffic between DRC and Zambia;

South (neighbouring) takes 80% of Zambia and all of Malawi and Mozambique traffic, without considering the traffic between DRC and Zambia. It is further assumed that, from the traffic between this zone and "others" in the JICA-study, 30% transits through the EAC region (using the Southern corridor)

Domestic Tanzanian traffic from JICA study (2010 data) is inserted in the matrix. For relations from the Tanzanian regions with zones outside of Tanzania, the internal distribution between the different Tanzanian regions is reproduced (different for import and export).

The 21 Tanzanian regions are redistributed into 8 zones, with some zones being added to the new South (neighbouring & Tanzania) zone (which also includes the old South (neighbouring) zone). These zones correspond to the largest cities, port areas and potentially important transfer points, relevant for the current corridor study, namely:

Arusha
Dar Es Salaam
Dodoma
Bukoba
Kigoma
Musoma
Mwanza
Isaka-Shinyanga
South (neighbouring & Tanzania) combines the old South (neighbouring) zone with Iringa, Lindi, Mbeya, Mtwara and Ruvuma regions of Tanzania.

The Kenyan traffic is split into 3 main zones: Mombasa, Nairobi and Eldoret (corresponding to Eastern, Central and Western Kenya). The matrix is weighted by the corresponding population. Assumptions are made in three steps:

From the Kenyan import and export, 35% is attributed to Mombasa, 60% to Nairobi and 5% to Eldoret;

The total traffic of Kenya is assumed to be 40% import/export, 10% domestic interzonal, and 50% domestic intrazonal (according to the Shippers Council of Eastern Africa Open Forum on Rail Sector Development, 20th March 2014, domestic traffic makes up more than half of the corridor traffic);

From the domestic interzonal traffic, 90% is assumed to move between Nairobi and Mombasa, 5% between Nairobi and Eldoret and 5% between Mombasa and Eldoret.

The Ugandan matrix is split into 2 zones and 1 external zone: Hoima, Kampala and Gulu (corresponding to the Albertine region, South-Eastern Uganda and Northern Uganda). The matrix is weighted by the corresponding population. Assumptions are made in three steps, in the same way as for Kenya:

From the Ugandan import and export, 5% is attributed to Hoima, 80% to Kampala and 15% to Gulu;

The total traffic in Uganda is assumed to be 40% import/export, 10% domestic interzonal, and 50% domestic intrazonal;

From the domestic interzonal traffic, 35% is assumed to move between Hoima and Kampala, 25% between Hoima and Gulu and 40% between Kampala and Gulu.

The “others” region from JICA study is split:

60% of this traffic is redistributed through the corresponding “rest of the world” zones (Rest of the world through Mombasa or Rest of the world through Dar Es Salaam – see next bullet) and 8% is assigned to the “South” zone (and is assumed to arrive/depart through the Southern corridor). The rest of this traffic is assumed not the use the major roads in the EAC;

From the “Corridor Diagnostic Study of the Northern and Central Corridors of Eastern Africa, April 2011”, a distribution between the different Rest of the world zones (Rest of the world through Mombasa and Rest of the world through Dar Es Salaam) is being deducted for each country (“import” and “export” always assuming through ports of Mombasa or Dar Es Salaam). These values are for 2009:

Burundi uses the port of Mombasa for 6% of its import and 2% of its export;
Kivu uses the port of Mombasa for 68% of its import and 82% of its export;
Rwanda uses the port of Mombasa for 43% of its import and 35% of its export;
Uganda uses the port of Mombasa for 99% of its import and 98% of its export;
Tanzania, Mpulungu-Kalemie and South only use the port of Dar es Salaam;
Kenya only uses the port of Mombasa.

As the Rest of the World zone is split by Mombasa and Dar es Salaam, the volumes through each port are predetermined, and port performances do not affect the seaport choice. It is assumed that investments in both ports will be in line with these volumes, to maintain port performance.

We can assume that the choice of a port depends on its dwell time and handling cost but also on its marketing and relationship with the landlocked countries using the port. In this case, the port with the lowest dwell time would take nearly all the traffic, as the share of time in port takes a very large share of total transport time (the first run of the model indicated this). This would not be realistic. For this reason, the consultant reasonably fixed the above assumptions concerning port’s choice. Ports have been considered separately by lack of additional explicative choice variables. The higher use of the port of Mombasa could be explained by the fact that the Central Corridor is mainly located in Tanzania while the Northern Corridor crosses several countries.

The import from Mombasa port is redistributed to each country with distributions as follows (these values are 2010 values from the report “Scaling up Corridor Monitoring for Informed Decisions”, April 2013):

11 311 000 tons to Kenya;

359 000 tons to DRC;

229 000 tons to Rwanda;

3 378 000 tons to Uganda;

5 000 tons to Burundi.

The above values are related to traffic for each country section on the Northern corridor. The Traffic includes international and domestic flows for year 2010.

The results are shown in the total traffic OD matrix (in thousand tons) below.

	Arusha	Dar Es Salaam	Dodoma	Bukoba	Kigoma	Musoma	Mwanza	Isaka - Shinyanga	Mombasa	Nairobi	Eldoret	Hoima	Kampala	Gulu	Rwanda	Bujumbura	Kivu	Mpulungu Kalemie	South	Ocean Mombasa	Ocean Dar Es Salaam	Musongati
Arusha	0,000	234,900	55,000	0,700	13,300	0,000	18,200	1,400	24,361	41,761	3,480	0,774	12,385	2,322	17,043	27,820	15,820	1,340	55,235	5,076	82,271	0,281
Dar Es Salaam	270,600	0,000	220,700	53,200	77,700	9,700	259,200	178,600	76,533	131,200	10,933	2,432	38,910	7,296	53,543	87,401	49,701	4,210	316,448	0,000	274,416	0,883
Dodoma	67,600	175,300	0,000	9,000	0,000	0,000	17,500	25,400	17,125	29,357	2,446	0,544	8,706	1,632	11,980	19,556	11,121	0,942	27,251	0,000	61,402	0,198
Bukoba	0,000	18,900	6,700	0,000	0,000	1,500	13,300	9,400	2,778	4,763	0,397	0,088	1,413	0,265	1,944	3,173	1,804	0,153	4,334	0,000	9,962	0,032
Kigoma	9,200	33,800	1,700	0,000	0,000	0,000	6,700	1,800	3,320	5,691	0,474	0,105	1,688	0,316	2,323	3,791	2,156	0,183	4,084	0,000	11,904	0,038
Musoma	0,000	18,700	1,000	0,000	0,000	0,000	11,900	3,000	2,215	3,797	0,316	0,070	1,126	0,211	1,550	2,530	1,438	0,122	8,358	0,000	7,942	0,026
Mwanza	22,300	147,300	9,400	23,500	13,100	17,500	0,000	38,800	15,484	26,544	2,212	0,492	7,872	1,476	10,832	17,683	10,055	0,852	28,982	0,000	55,519	0,179
Isaka - Shinyanga	20,200	60,500	34,300	0,500	0,500	12,500	18,100	0,000	10,211	17,505	1,459	0,324	5,192	0,973	7,144	11,661	6,631	0,562	14,655	0,000	36,614	0,118
Mombasa	18,630	38,437	13,454	3,215	3,942	1,857	12,694	11,072	0,000	1979,173	109,954	36,313	581,000	108,938	46,550	10,742	37,800	2,923	90,193	394,380	0,000	0,109
Nairobi	31,937	65,892	23,063	5,512	6,758	3,183	21,760	18,981	1979,173	0,000	109,954	62,250	996,000	186,750	79,800	18,414	64,800	5,010	154,617	676,080	0,000	0,186
Eldoret	2,661	5,491	1,922	0,459	0,563	0,265	1,813	1,582	109,954	109,954	0,000	5,188	83,000	15,563	6,650	1,535	5,400	0,418	12,885	56,340	0,000	0,016
Hoima	0,315	0,651	0,228	0,054	0,067	0,031	0,215	0,188	7,788	13,350	1,113	0,000	407,116	290,797	33,550	3,119	28,720	1,805	3,121	20,286	0,414	0,032
Kampala	5,048	10,415	3,645	0,871	1,068	0,503	3,439	3,000	124,600	213,600	17,800	407,116	0,000	465,275	536,800	49,896	459,520	28,880	49,931	324,576	6,624	0,504
Gulu	0,946	1,953	0,683	0,163	0,200	0,094	0,645	0,563	23,363	40,050	3,338	290,797	465,275	0,000	100,650	9,356	86,160	5,415	9,362	60,858	1,242	0,095
Rwanda	0,485	1,001	0,351	0,084	0,103	0,048	0,331	0,288	23,100	39,600	3,300	1,400	22,400	4,200	0,000	12,870	22,400	1,400	5,189	12,810	23,790	0,130
Bujumbura	0,320	0,661	0,231	0,055	0,068	0,032	0,218	0,190	3,465	5,940	0,495	0,990	15,840	2,970	4,950	0,000	4,752	0,297	3,134	0,440	21,538	8,662
Kivu	0,259	0,534	0,187	0,045	0,055	0,026	0,176	0,154	1,960	3,360	0,280	0,320	5,120	0,960	0,000	0,792	0,000	0,000	144,741	889,142	195,178	0,008
Mpulungu Kalemie	0,275	0,567	0,199	0,047	0,058	0,027	0,187	0,163	0,385	0,660	0,055	0,020	0,320	0,060	0,150	4,851	0,000	0,000	32,537	0,000	117,840	0,049
South	94,301	694,498	79,532	13,464	11,040	16,551	50,506	49,504	58,673	100,582	8,382	2,119	33,908	6,358	28,042	118,039	24,474	6,187	0,000	0,000	777,930	1,192
Ocean Mombasa	61,078	0,000	0,000	0,000	0,000	0,000	0,000	0,000	2826,590	4845,583	403,799	120,576	1929,224	361,729	163,725	12,973	256,132	0,000	0,000	0,000	0,000	0,131
Ocean Dar Es Salaam	990,031	2168,636	759,061	181,415	222,405	104,750	716,174	624,707	0,000	0,000	0,000	1,355	21,672	4,064	155,952	203,243	471,552	243,600	2403,383	0,000	0,000	2,053
Musongati	0,003	0,007	0,002	0,001	0,001	0,000	0,002	0,002	0,035	0,060	0,005	0,010	0,160	0,030	0,050	8,662	0,048	0,003	0,032	0,004	0,218	0,000

The calculated OD matrix for 2010 is an estimated matrix which will be calibrated and used as input for the corridor model. Musongati zone has been added according to its mining and mineral potential. The distribution between all origins and destinations will be modified after calibration data on each link (road/lake/rail) of the corridors.

Matrix forecast methodology

For each of the time horizons (2015, 2020, 2025, 2030, 2040, 2050), new OD matrices have been constructed based on estimated trends of future GDP. For each horizon, different scenarios were elaborated: current trends regression, optimistic and pessimistic scenario.

The process has been the following.

International Traffic OD Matrix estimation (Import/Export vs GDP)

Domestic Traffic OD Matrix estimation (Import/Export vs GDP of related countries)

- Weighting factor of GDP growth per region (r) of a country is ($\frac{Pop_r}{\sum Pop}$)
- GDP growth per region for a given GDP country growth is gave by: $\frac{Pop_r}{\sum Pop} * (1 + GDP)$. Note that GDP depicts the GDP growth, not the value of the GDP. Thus, the GDP growth of a country is proportionally distributed per region.
- Previous Export and Import are timed by estimated regional GDP growth for each region
- New Export and Import are distributed among previous OD matrix using Furness method for matching origin and destination constraints

Assumption on GDP and GRDP evolution (Pessimistic, current trend, Optimistic) for 2015, 2020, 2025, 2030, 2040 and 2050

Use of Furness method to match the sums of origin and destination traffics coming from and going to each zone of the study area. Furness is an iterative method which consists in matching, for each zone, total origin and destination traffics. The method allows filling the related origin and destination matrix according to the cost, time or traffic distribution between two zones.

A. GDP Growth per country and traffic forecast

The estimation of the GDP growth per country is shown in the table below

GDP Growth since 2001

Country	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Burundi	2%	2%	2%	4%	4%	5%	3%	5%	4%	5%	4%
Democrati	-2%	3%	6%	7%	6%	5%	6%	6%	3%	7%	7%
Kenya	4%	1%	3%	5%	6%	6%	7%	2%	3%	6%	4%
Malawi	-4%	2%	6%	5%	2%	2%	9%	8%	9%	6%	4%
Mozambiq	12%	10%	6%	8%	9%	8%	7%	7%	6%	8%	7%
Rwanda	8%	13%	2%	7%	9%	9%	8%	11%	6%	7%	8%
Tanzania	6%	7%	7%	8%	7%	7%	7%	7%	6%	7%	6%
Uganda	9%	7%	6%	6%	10%	7%	8%	10%	4%	6%	6%
Zambia	0%	0%	10%	9%	0%	8%	8%	7%	7%	6%	6%

Country	2012	2013	2014	2015	2016	2017	2018	2019	Min	Max	Current tre	Pessimisti	Optimistic	Countries
Burundi	4%	4%	5%	5%	5%	5%	5%	5%	2%	5%	5%	4%	7%	Burundi
Democrati	7%	8%	9%	9%	8%	7%	6%	6%	-2%	9%	7%	5%	9%	DRC
Kenya	5%	6%	6%	6%	6%	6%	7%	7%	1%	7%	7%	5%	9%	Kenya
Malawi	2%	5%	6%	7%	6%	6%	6%	6%	-4%	9%	7%	5%	9%	Malawi
Mozambiq	7%	7%	8%	8%	8%	8%	8%	8%	6%	12%	8%	5%	11%	Mozambique
Rwanda	8%	5%	7%	8%	7%	8%	7%	8%	5%	13%	7%	5%	10%	Rwanda
Tanzania	7%	7%	7%	7%	7%	7%	7%	7%	6%	7%	7%	5%	9%	Tanzania
Uganda	3%	6%	6%	7%	7%	7%	7%	7%	3%	10%	8%	5%	10%	Uganda
Zambia	11%	5%	5%	9%	8%	4%	7%	7%	0%	11%	7%	5%	9%	Zambia

Source: International Monetary Fund, World Economic Outlook Database, April 2014
Gross Domestic Product, Billions, constant prices, National currency

current trend: based on current observed GDP growth (IMF)
pessimistic: average of minimum GDP
optimistic: average of Maximum GDP

The GDP growth calculations are made as follows:

- Current trend of GDP growth is based on observed and estimated values from 2001 to 2019
- Optimistic GDP growth per country is estimated as follows

$$GDP_{Op} = \frac{(\sum Max)/n}{(\sum Cur)/n} * \text{Cur}$$

Where
N: the number of years of observation
Max: maximum growth of observed GDP
Cur: current trend of GDP growth

- Pessimistic GDP growth per country

$$GDP_{pes} = 2 * Cur\text{-}GDP_{Op}$$

B. Forecast Matrices

Based on the O-D matrices of year 2010, exports and imports for each horizon (2015, 2020, 2025, 2030, 2035, 2040, 2045 and 2050) and for each country, forecast matrices have been determined.
For international OD Matrices, exports and imports in current trends conditions for each country were calculated as follows:

- $Exp_{i,n} = Exp_{i,2010} * (1 + Cur_{i,n})^{n-2010}$
- $Imp_{i,n} = Imp_{i,2010} * (1 + Cur_{i,n})^{n-2010}$

Exp: export traffic
Imp: import traffic
i: country “”"
n: horizon (year) “n”
Cur: current GDP growth trend

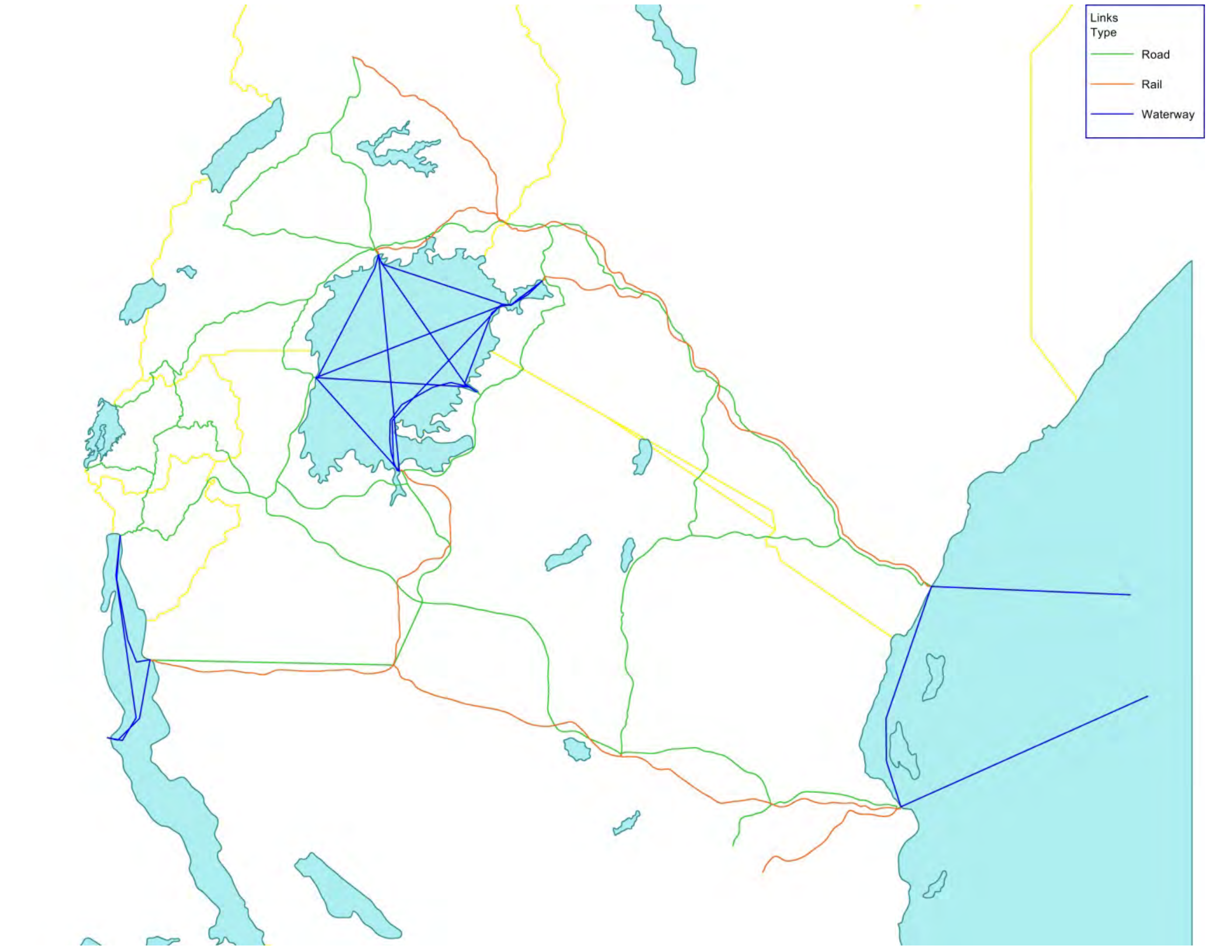
Furness method has been used to balance exports and imports traffic in order to match origin and destination constraints and build forecast matrices.
The same methodology has been used for domestic OD matrices. GDP for related countries have been used and weighted according to the populations of each region.

Transport network modelling

The main transport links and nodes are modelled:

Intermodal transfer points: ICDs, inland lake ports
Links: railway lines, main roads on the corridor, lake transport links.

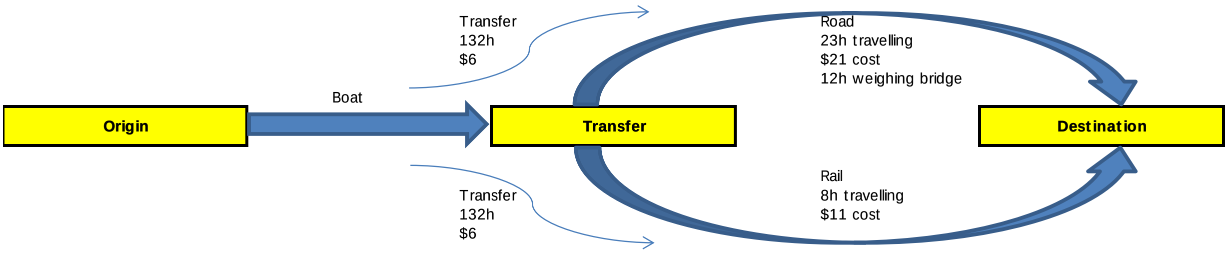
The seaports of Mombasa and Dar es Salaam are also modelled as intermodal transfer points, but their performance does not affect modelled traffic volumes. Therefore the transit time and cost in these ports are set to a standard value, without affecting the functioning of the model.



As this is a regional freight model, the level of detail of the network is limited to the major transport links and nodes, i.e. the corridors and lake transport. This allows an estimation of the traffic flows on these main links and nodes, without detailed analyses of the local networks.

For each link and node, the average transport time and costs are estimated. The variability of transport times is included in the average transport time[11]. The example below shows the transport times for the links and nodes between one origin and destination through a transfer point.

[11] Variability is caused by excessively long waiting times due to service breakdown, congestion, etc. If a project reduces variability by eliminating these longest waiting times, the average waiting time will decrease, resulting in a more attractive transport service.



Characteristics of the current transport network and main assumptions

The transport times and costs of the existing transport networks are based on the following assumptions:

TRL railways:

- Average transport prices for bulk goods: 0.08 USD/ton-km[12]
- Average transport prices for containers: 2.27 USD/TEU-km[13]
- Transit speeds: 18 km/h[14] (60% waiting time; 40% driving time[15])
- Variability of transport time and transfers: standard deviation = 45% of average travel time[16]
- Time for loading/ unloading at intermodal transfer points: 36 hours[17]

RVR railways:

- Average transport prices for bulk goods: 0.11 USD/ton-km[18]
- Average transport prices for containers: 1.22 USD/TEU-km[19]
- Average transit speeds: 15,6 km/h[20] (60% waiting time; 40% driving time[21])
- Variability of transport time and transfers: standard deviation = 45% of average travel time[22]
- Time for loading/ unloading at intermodal transfer points: 36 hours[23]

Road transport

- Transport prices: 0.12-0.15 USD/ton-km (variations depending on the state of the road)[24]

[12] Source: "Comprehensive transport and trade system development master plan in the United Republic of Tanzania: Progress Report" Ministry of Transport, Tanzania (2011), confirmed by CCTTFA in 2014.

[13] This price includes the return of the empty container. TRL reserves the right to load the container again in the way back. Source: Project Appraisal Document, Intermodal and Rail Development Project, WB, 2014

[14] Source: Central Corridor Database, WB, including delay times (train dispatching, intermediate yards, crew changes, etc.)

[15] Corridor Diagnostic Study, Nathan Associates, 2011.

[16] Own calculations based on maximum waiting time in Corridor Diagnostic Study, Nathan Associates, 2011.

[17] Source: RAHCO 2012 (CPCS, Study on upgrading and performance improvements for TRL): 24 hours loading/unloading + 12 hours shunting at departing/receiving yard

[18] Source: World Bank assessment 2014, Lynn Freight Rates along Northern Corridor

[19] Source: World Bank assessment 2014, Lynn Freight Rates along Northern Corridor

[20] Source: World Bank assessment 2014/ Northern Corridor Database

[21] Similar to Central Corridor

[22] Own calculations based on maximum waiting time in Corridor Diagnostic Study, Nathan Associates, 2011.

[23] Assumed to be similar to the Central Railway line: 24 hours loading/unloading + 12 hours shunting at departing/receiving yard

[24] Previous studies usually considered transport prices by road between 0.10 – 0.15 USD per ton-km.

- Average total **travel speed**: around 19.5 km/h[25]. This may vary according to the state of the road. (30% rest time; 70% driving time[26])
- Share of waiting time in total travel time (Nathan Associates, 2011)
- Variability of transport time: standard deviation = 7.5% of average travel time[27]

- Waiting times at **border posts** (hours):

Table 12-2: OD Matrix Structure

Malaba	3.5	2013
Gatuna/Katuna	3	2013
Akinyaru/Kinyaru	1	2010
Rusumo	19	2013[28]
Mutukula	7	2011
Kobero/Kabanga	12	2013[29]

- Waiting times at **weighbridges** (hours):

Table 12-3: Waiting times weighbridges

Weighbridge	Waiting time (hours)	Year
Kibaha	0.9	2013[30]
Kihonda	0.2	2013
Mikese	0.2	2013
Dodoma-Nala	0.1	2013
Singida-Nyuki	0.2	2013
Mwendakulima	0.5	2013
Nyakahura	0.5	2013
Mariakani	1.86	2013
Athi river	4.66	2013
Webuye	3.12	2013

Inland navigation:

- Average transport prices: Lake Victoria: 0.07 USD/ton-km[31]; Lake Tanganyika: 0.06 USD/ton-km[32]
- Average travel speeds: 22 km/h[33]
- Variability of transport time: standard deviation = 7.5% of average travel time[34]

[25] Average of various sources: Corridor Diagnostic Nathan Associates, CCTTFA, Comparative cost study on Port of Mombasa & Dar es Salaam, World Bank assessment 2014, calibration, …

[26] Estimation based on Corridor Diagnostic Study, Nathan Associates, 2011, excluding waiting times at weighbridges and border posts.

[27] Own calculations based on maximum waiting time in Corridor Diagnostic Study, Nathan Associates, 2011.

[28] CCTTFA

[29] CCTTFA

[30] Source: CCTTFA third quarter 2013

[31] Source: CCTTFA, World Bank assessment 2014

[32] Source: Integrated Lake Transport Strategy 2009

[33] Source: World Bank assessment 2014

[34] Similar to road transport: low variability

- Average time in port: 132 hours (including waiting time for ships, loading & unloading)[35]
- Variability of time in port: standard deviation = 45% of average travel time[36]
- Average freight handling costs in the ports: 6 USD/ton[37] for RoRo (lake Victoria); 70 USD/TEU for LoLo (Lake Tanganyika).

Impact of proposed projects on network characteristics

The projects in each scenario are listed in the previous report. To estimate the traffic forecasts related to these priority projects in each scenario, the transport network needs to be adjusted for the future scenarios. A change in the network characteristics will affect the traffic assignment as explained later in this document. Two types of network adjustments are considered:

- Adding/removing links and nodes (e.g. add a railway link in a scenario to estimate the impact of an extension of a railway line)
- Adjust the time/cost characteristics of existing links and nodes (e.g. decrease travel times on rail segments to estimate the impact of rehabilitating the network).

For future projects, the following assumptions are made.

Railway transport:

- Rehabilitated meter gauge line:
  - Double the average transit speeds (ca. 30km/h)[38]
  - Improving travel time in the total transport time
  - Reduction of Transport price according to the gain in travel time
- new lines (standard gauge or new meter gauge):
  - Average speeds: up to 40 km/h[39]
  - Improving travel time in the total transport time
  - Reduction of Transport price according to the gain in travel time

Road transport:

- Rehabilitation of roads: transport prices and travel speed improve to the same level as the roads in good state. The consultant assumes a decrease of 5% of transport price.
- Modernisation of weighbridges: halving of waiting times.

Inland navigation:

- Impact of port projects: time in port decreases to 50 hours due to increased service frequency and subsequent decreased waiting time in the port.
- New lake transport systems: increase travel speed to 32 km/h (Source: WB study 2010)
- Transport price reduction is proposed from 17% to 42% according to the projects impacts.

Generalized cost

A generalized cost has been adjusted based on the Tanzania Master Plan study (JICA). The generalized cost combines travel time, waiting time, monetary cost and transport service reliability into one cost determining mode choice and route choice.

$$GC = \alpha * Wait_T + \beta * Trvl_T + \mu T_{rate} + \gamma * stddev$$

Where

$Wait_T$: waiting time

$Trvl_T$: travel time

T_{rate} : transport prices

$stddev$: standard deviation

[35] World Bank assessment 2014

[36] Similar to rail transport: high variability

[37] Source: "Comprehensive transport and trade system development master plan in the United Republic of Tanzania: Progress Report" Ministry of Transport, Tanzania (2011).

[38] JICA intermodal study, CPCS-RAHCO

[39] Speeds of freight trains are considered to be higher on new infrastructures (with no difference between meter gauge or standard gauge tracks) compared to existing tracks. Maximum speed on standard gauge railway lines is planned to be 80 km/h for freight trains, and average speeds which also include waiting times and stops are considered in the model.

α: value of waiting timeβ: value of travel time
µ: value of travel rate
γ: value of variability

This formula is used with the parameters α = 0.57, β = 0.49 and $\mu = 1$ from the JICA study.

The factor ($\gamma * stddev$) represents the transport reliability. It is assumed that the *value of variability (γ)* is higher for rail and lake transport modes than for road transport. The values used are based on general values used in literature[40].

- 0.44USD/h for road transport (90% of the value of transport time)
- 1.47 USD/h for the other modes and transfers (3 times the value of transport time).

Multimodal traffic assignment on the network

The model uses the generalized cost to assign the transport flows of the O-D matrix to the transport network. Traffic is assigned to specific modes and routes, minimizing their total generalized cost, taking into account transport mode reliability, transfer penalties and transport time and price.

Model calibration

Calibration compares the modelled traffic volumes with the observed traffic volumes on some key segments of the transport network. This is done in two steps: firstly, a manual calibration is done, adjusting some values in order to ensure that the model correctly represents the real-world conditions. A second, automatic, calibration is done to further improve the correlation between modelled values and observed values.

The first manual calibration allows for a distinction of preferences by type of commodity transported. The demand matrix is divided in 4 parts, to account for different preferences among the type of goods:

- One part includes 72% of all movements, which are not allowed to use rail;
- Three parts include the remaining 28% of all movements, which are allowed to use all modes of transport. These three parts result from an equal division with different relative importance of transfer and "driving" cost according to the following formulas:
  - 1x cost "driving" = 1x cost transfer
  - 4x cost "driving"= 5x cost transfer
  - 5x cost "driving"= 4x cost transfer

Transfer costs include both loading and unloading. "Driving" costs include costs while remaining on the same mode, whether road, rail, inland waterways or sea.

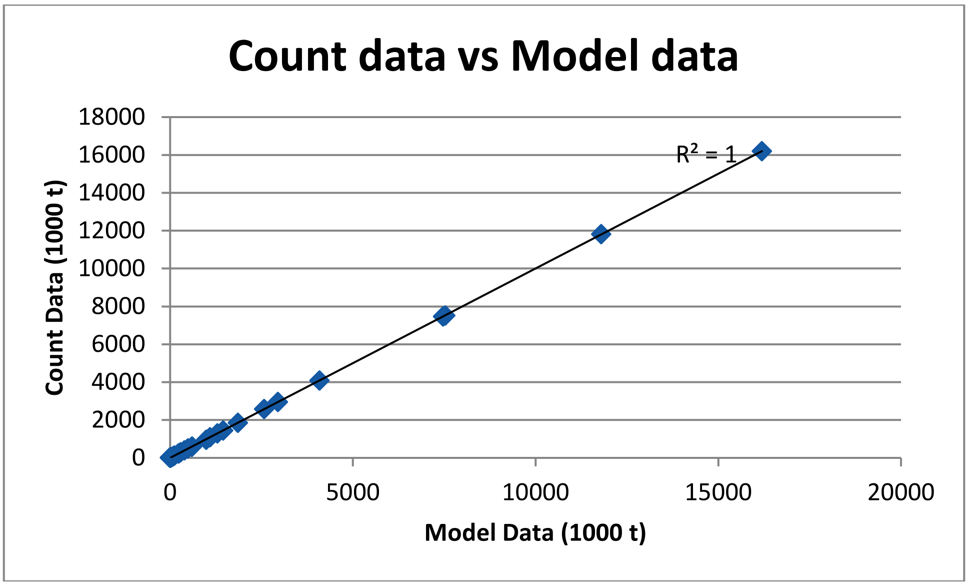
Secondly, the model is calibrated automatically according to existing data on port and inland navigation volumes, inland road traffic counts and rail traffic volumes, identified from a range of sources ("Shippers Council of Eastern Africa open Forum on Rail sector Development, March 2014", "East Africa Logistics Performance Survey 2012", "Comprehensive Master plan in Tanzania, JICA Study, 2013" and "CDS, Nathan Associates, 2011).

The data used for the automatic calibration are shown in the following calibration table.

[40] http://www.internationaltransportforum.org/Proceedings/reliability/index.html

From	To	Count Data (C) (1000 tonns)	Calculated Data (M) (1000 tonnes)	Mode	GEH
Kisumu Port	Mwanza Port	0	16	inland waterway	5.7
Mwanza Port	Kampala port	4	22	inland waterway	5.0
Kampala port	Mwanza Port	2	13	inland waterway	3.8
Kigoma Port	Bujumbura Port	4	1	inland waterway	2.0
Kigoma Port	Kalemie	9	15	inland waterway	1.8
Mwanza Port	Kisumu Port	0	1	inland waterway	1.4
Kalemie	Kigoma Port	25	30	inland waterway	0.9
Bujumbura Port	Kigoma Port	17	14	inland waterway	0.8
Mombasa	Nairobi	985	960	rail	0.8
Kampala	Tororo Rail	95	100	rail	0.6
Tororo Rail	Kampala	390	400	rail	0.5
Isaka	Tabora	17	15	rail	0.4
Nzega	Isaka	601	592	road	0.4
Nairobi	Mombasa	245	240	rail	0.3
Huye	Bukavu	288	293	road	0.3
Kampala	Tororo	596	590	road	0.2
Voi	Nairobi	11798	11817	road	0.2
Tororo	Kampala	4092	4082	road	0.2
Isaka	Nzega	223	225	road	0.2
Bukavu	Huye	75	74	road	0.1
Dar Es Salaam	Dodoma	492	494	rail	0.1
Ocean Dar Es Salaam	Dar Es Salaam Port	7535	7527	ocean	0.1
Mombasa Port	Ocean Mombasa	2571	2575	ocean	0.1
Morogoro	Dodoma	7469	7474	road	0.1
Ocean Mombasa	Mombasa Port	16194	16201	ocean	0.1
Dodoma	Dar Es Salaam	122	123	rail	0.1
Tabora	Isaka	39	39	rail	0.1
Dodoma	Morogoro	1859	1857	road	0.0
Dar Es Salaam Port	Ocean Dar Es Salaam	1455	1454	ocean	0.0
Nairobi	Voi	2952	2954	road	0.0
Kisoro	Goma	1293	1292	road	0.0
Goma	Kisoro	1091	1092	road	0.0

The results of the calibration show a very good correlation between count and calculated data. Correlation between observed values (count data) and model data is illustrated in the following figure.



Moreover, in transport modelling, besides the r^2 coefficient between observed and model values, the calibration strength is usually measured by the GEH indicator.

$$GEH = \sqrt{\frac{2(M-C)^2}{M+C}}$$

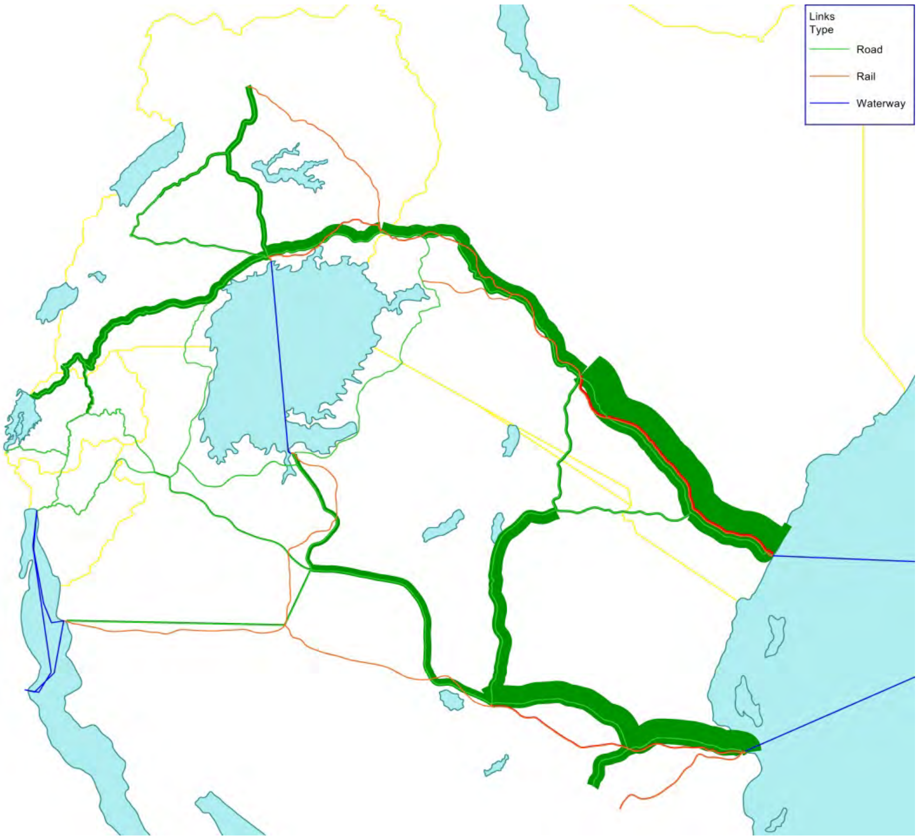
(M= model data, C= count data)

While there is no generally accepted rule to validate the calibration, a calibration where 80% of the GEH-values is <5, is usually considered as a very good result.
For the available count data, the GEH for 91% of the links is <5 in the current traffic model.

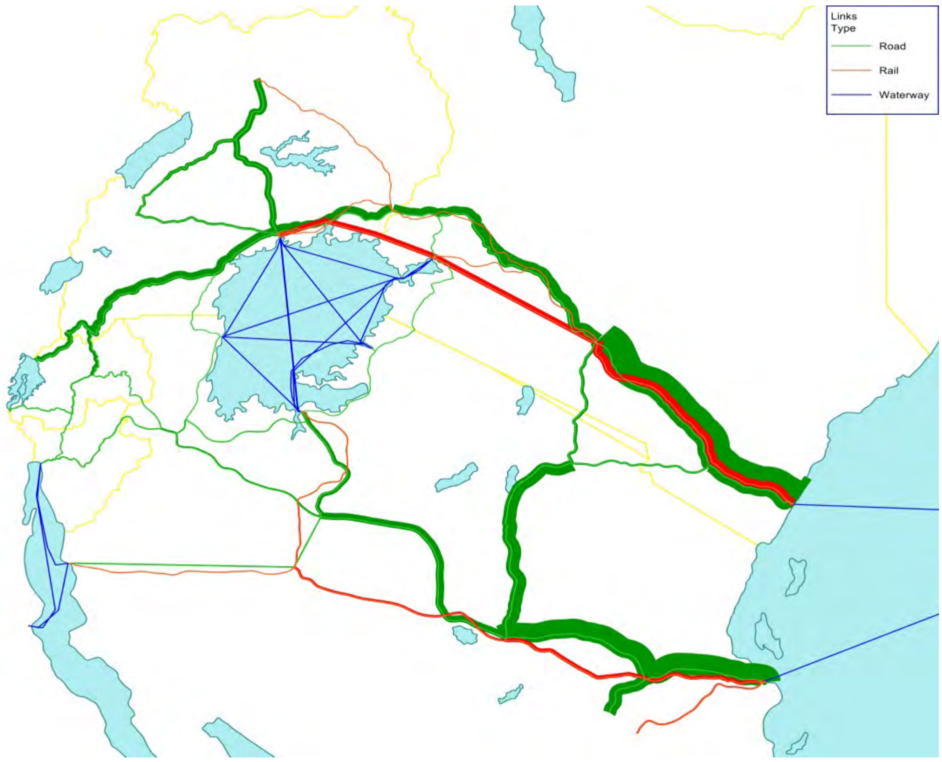
The standard method of comparison is to compare modelled values against observations. Two alternative analytic methods that are frequently applied to validation comparisons are outlined below.

- The GEH statistic is a form of the Chi-squared statistic that incorporates both relative and absolute errors.
- A further form of comparison that is sometimes used is to plot modelled values against observed values and to carry out a correlation analysis between the two sets of values. The correlation coefficient (R) gives some measure of the goodness of model fit, and the slope of the best-fit regression line through the origin indicates the extent to which modelled values are over or under estimated.

After the base year model calibration and validation, traffic forecasts have been elaborated for different time horizons and project scenarios. An example of the assignment of the demand forecasts on the transport network is illustrated in the following figure.



The following figure depicts traffic flows in the case of the rehabilitation of the corridors in 2030.



Traffic on Lake Victoria becomes more important and distributed over the lake, allowing thus integration between all transport modes (rail, road and lake) in the EAC region. A shift from road to rail is also observed. The original document presents the results of all the scenarios.

Model Output

Principles

To allow the comparison between different scenarios, the model provides the following main outputs:

- Generalized total travel time (including travel cost, travel time and waiting time at border crossing)
- Transfer generalized time
- Corridor traffic forecast volumes (tonnes for each link and node, for road, rail, lake and seaports)

Model output can be displayed in different manners. The table below shows for each link:

- Length of the link
- Nodes (cities) defining the links
- Available count data
- Type of mode of transport
- Generalized Total travel time
- Generalized Speed
- Volume (1 000 t)
- Volume x length (1 000 000 tkm)

From	To	Folume (1000 ton)	Type	Length	Generalized total travel time (hours)	Generalized speed (km/h)	Volume (1000 ton)	Volume (million ton kilometers)
Gitega	Muzani	77	road	179km	23	8km/h	77	14
Muzani	Gitega	266	road	179km	23	8km/h	266	48
Biharamulo	Kikongo	187	road	218km	17	13km/h	187	41
Kikongo	Biharamulo	289	road	218km	17	13km/h	289	63
Dodoma	Morogoro	1859	road	253km	16	16km/h	1859	470
Morogoro	Dodoma	7469	road	253km	16	16km/h	7469	1889
Kisoro	Kabale	1091	road	50km	3	16km/h	1091	54
Kabale	Kisoro	1293	road	50km	3	16km/h	1293	64
Bukavu	Huye	75	road	113km	7	16km/h	75	8
Huye	Bukavu	288	road	113km	7	16km/h	288	33
Kigali	Kayonza	55	road	73km	5	14km/h	55	4
Kayonza	Kigali	211	road	73km	5	14km/h	211	15
Morogoro	Dar Es Salaam	2547	road	192km	13	15km/h	2547	490
Dar Es Salaam	Morogoro	8101	road	192km	13	15km/h	8101	1557
Dodoma	Tabora	102	rail	371km	23	16km/h	102	38
Tabora	Dodoma	34	rail	371km	23	16km/h	34	13
Dodoma	Dar Es Salaam	122	rail	426km	26	16km/h	122	52
Dar Es Salaam	Dodoma	492	rail	426km	26	16km/h	492	210
Arusha	Dodoma	1250	road	385km	23	16km/h	1250	482
Dodoma	Arusha	3889	road	385km	23	16km/h	3889	1499
Arusha	Voi	475	road	225km	14	16km/h	475	107
Voi	Arusha	342	road	225km	14	16km/h	342	77
Arusha	Nairobi	765	road	239km	15	16km/h	765	183
Nairobi	Arusha	398	road	239km	15	16km/h	398	95
Lusahunga	Nyantwiga	167	road	18km	1	16km/h	167	3
Nyantwiga	Lusahunga	527	road	18km	1	16km/h	527	9
Lusahunga	Biharamulo	268	road	33km	2	16km/h	268	9
Biharamulo	Lusahunga	254	road	33km	2	16km/h	254	8
Kikongo	Mwanza	1077	road	21km	1	16km/h	1077	22
Mwanza	Kikongo	438	road	21km	1	16km/h	438	9
Dodoma	Nzega	2314	road	419km	26	16km/h	2314	969
Nzega	Dodoma	728	road	419km	26	16km/h	728	305

The following table presents the synthetic results at the corridors levels from the calibrated model. These results constitute the reference situation for the demand modelling and analysis.

Use of Northern corridor in million ton kilometers, 2010						
	Origin	Mombasa Port	Nairobi	Kampala		
	Destinatio	Nairobi	Kampala	Kigali	total	% rail
road	import	5.291	3.003	947	9.241	
	export	2.647	625	359	3.632	
	total	**7.938**	**3.628**	**1.307**	**12.873**	
rail	import	430	257	-	686	7%
	export	109	63	-	172	5%
	total	**539**	**320**	**-**	**858**	**6%**

Use of Central corridor in million ton kilometers, 2010						
	Origin	Dar es Salaam Por	Dodoma	Isaka		
	Destinatio	Dodoma	Isaka	Kigali	total	% rail
road	import	3.085	1.538	179	4.801	
	export	701	347	56	1.103	
	total	**3.785**	**1.885**	**234**	**5.905**	
rail	import	206	19	-	225	4%
	export	52	7	-	59	5%
	total	**258**	**26**	**-**	**284**	**5%**

Import and export through major ports (1000 ton), 2010			
	Import	Export	Total
Dar Es Salaam	7.591	1.456	9.047
Mombasa	16.087	2.519	18.606
Mwanza (all <-> Uganda)	13	22	35

Appendix V Methodology of Landing Site Shortlisting

The aim of the Landing Site shortlisting procedure is to shortlist the landing sites that are most suitable for the development of the ferry service network, relevant for Project Area B. The methodology is as follows

- District officials of Uganda districts connected to Lake Victoria have collected information on Landing Sites in their respective districts, and their characteristics: Location, ownership structure, estimated population served, number of wooden passenger boats, total available acreage on Landing Sites, number of connecting Landing Sites by woorden passenger boats, etc.
- MTBS has constructed a tool based on a Multi-Criteria Analysis to facilitate shortlisting the identified Landing Sites. The tool enables the user to prioritise criteria. Once the weights of the criteria are deterimined, the tool shows the name and location of the 20 most relevant Landing Sites. A map shows the distribution of the Landing Sites over the districts. The results can be tweaked, to adjust the Landing Sites for each district, to arrive at an optimal distribution of Landing Sites over the mainland and the islands of Lake Victoria.
- A workshop has been held in Kampala in March 2017 with representatives of the Ministry of Works and Transport of Uganda and the district offcials from districts connected to Lake Victoria, to discuss the most optimal shortlist of Landing Sites.

MTBS Tool for Site Selection

Input & Weight factors

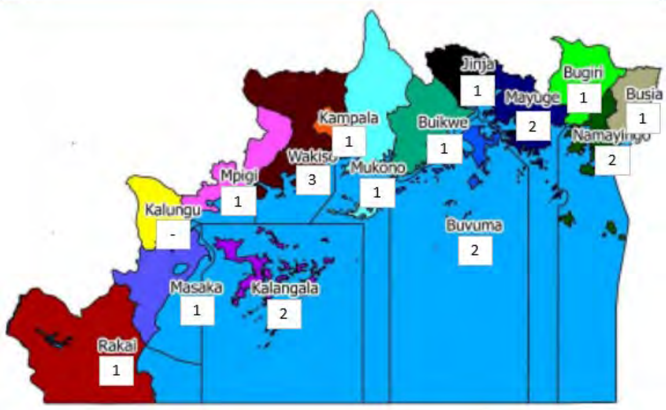
Criteria	Weight	0	1	2	3	4	5
Population Served	-	x					
Landing Sites Connected to LS	-	x					
Total Available Acreage	5						x
Residents	5						x
Transport Boats	5						x
Fishing Boats	5						x
Number of Cars	-	x					
Number of Motor Cycles	-	x					

Selected Landing Sites per District

Selected approach: Multi-criteria

	LS per district	Manual	Manual adjustmen	Total
Bugiri	2	-	1	1
Buikwe	2	-	1	1
Busia	3	-	1	1
Buvuma	7	-	2	2
Jinja	5	-	1	1
Kalangala	66	-	2	2
Kalungu	3	-	-	-
Kampala	1	-	1	1
Masaka	14	-	1	1
Mayuge	62	-	2	2
Mpigi	2	-	1	1
Mukono	48	-	1	1
Namayingo	22	-	2	2
Rakai	4	-	1	1
Wakiso	11	-	3	3
Control	252	-	20	20

Map



Appendix VI Ferry Passenger Survey Results

The figures on the next pages provide an overview of the type and amount of data that was gathered from the passenger interviews at the landing sites. Due to the size of the datasets, only the data for Lyabaana is presented to serve as an example.

Survey #	1	2	3	4	5	6	7	8	9	10
Survey Question										
Date & Time										
Landing Site	LYABANA	LYABANA	lyabana	Lyabana	LYABANA	LYABANA	LYABANA	LYABANA	Lyabana	Lyabana
Date	17 03 2017	17 03 2017	17 03n 2017	17 03 2017	17 03 2017	17 03 2017	17 03 2017	18 03 2017	18 03 2017	18 03 2017
Time	01 hours 22 min	08hours 51 min	09hours 48 min	09hours 55min	10hours16min	10hour 37min	05hours20min	07hours20min	7 hours 34 min	8 hours 5 mins
Person Characteristics										
Name	lutaya dessan	mutebi henry	muteesi fazira	luyimbazi	okello sixtus	haji ali	ssentingo bbosa	nampiima sarah	Tenywa Ronald	sebwatto Ronald
Sex	male	male	female	male	male	male	male	female	male	male
Salary	.... UGX	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Age	34	38	41	26	36	52	33	22	37	36
Occupation	business woman	business man	business woman	fisherman	business man	business	fisherman	NO	fisher man	Fisher man
Car possession	NO	N/A	NO	N/A	NO	N/A	no	N/A	NO	NO
Trip Characteristics										
Place of Origin	mukono	kiyindi	kiyindi	kiyindi	kiyindi	lyabana	lyabana	lyabana	Mukono	Mukono
Destination	lyabana	lyabana	lyabana	lyabana	lyabana	senyi	mayuge	lugazi	Lyabana	Lyabana
Vehicle 1	taxi	wooden tansport boat	wooden transport boat	wooden transport boat	wooden transport boat	fishing vessel	fishing boat	fishing vessel	taxi	taxi
From - To	mukono to ssenyi	kiyindi to Nkatta	kiyindi to nkatta	kiyindi to lyabana	kiyindi to nkatta	lyabana to ssenyi	lyabana to senyi	lyabana to senyi	mukono to lugazi	mukono to lugazi
Vehicle 2	cargo boat	wooden boat	wooden transort boat	N/A	wooden transport boat	N/A	taxi	boda boda	taxi	boda bod
From - To	lyabana	nkatta to Lyabana	nkatta to lyabana	N/A	nkatta to lyabana	N/A	ssenyi to mayuge	ssenyi to lugazi	lugazi to senyi	lugazi to ssenyi
Vehicle 3	N/A	N/A	N/A	N/A	N/A	N/A	boda boda	N/A	wooden transport boat	wooden boat
From - To	N/A	N/A	N/A	N/A	N/A	N/A	mayuge to home	N/A	ssenyi to lyabana	ssenyi to lyabana
Number of Interchanges	N/A	N/A	-	-	-		2	1	2	2
Purpose of travel	business	Business	business	fishing	business	business	visiting family	medication	fishing	fishing
Frequency of travel	2 times per week	N/A	3times per week	1per week	1 time per week	8 times per month	3per month	N/A	4 times per week	N/A
Journey Time	9 hours 30 min	8 hours 30min	8hours 30 min	8hours 30min	8hours	5hours 0min	9hours 0min	6hours 0min	2 hours 0min	6 HOURS 0MIN
Costs of Trip	37000 UGX	13 000	13 000	13 000	30 000	12 000	20 000	16 000	12 000	20 000
Waiting Time at Interchange 1	1 hours 20 min	N/A	0hours 40min	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Waiting Time at Interchange 2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Goods Characteristics										
Commodity 1	banana	banana	sodas	N/A	charcal	fish	N/A	N/A	meat	N/A
Weight 1	15sacks Kg	6sacks	7crates	N/A	7sacks	20kg	N/A	N/A	60kg	N/A
Value 1	225000UGX	120 000	150 000	N/A	245 000	240 000	N/A	N/A	600 000	N/A
Commodity 2	cassava	rice	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Weight 2	9sacks	50kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Value 2	990 000	170 000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Commodity 3	sweet potetoes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Weight 3	6sacks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Value 3	336 000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Commodity 4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Weight 4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Value 4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Commodity 5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Weight 5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Value 5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Commodity 6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Weight 6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Value 6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Weight	30 Kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Value	1551000 UGX	290 000	150 000	N/A	245 000	240 000	N/A	N/A	600,000UGX	N/A
							N/A	N/A		
Willingness to Pay 1										
5,000 UGX	YES	YES	yes	YES	YES	YES	yes	yes	Yes	YES
10,000 UGX	YES	YES	yes	YES	YES	YES	yes	no	yes	YES
15,000 UGX	YES	NO	NO	YES	YES	YES	no	no	no	no
20,000 UGX	YES	NO	NO	NO	NO	YES	no	no	no	no
25,000 UGX	No	NO	NO	NO	NO	YES	no	no	no	no
Willingness to Pay 2										
5,000 UGX	YES	YES	YES	YES	YES	YES	yes	yes	yes	yes
10,000 UGX	YES	yes	YES	YES	YES	YES	yes	no	yes	yes
15,000 UGX	YES	NO	NO	YES	YES	YES	no	no	no	no
20,000 UGX	YES	NO	NO	NO	YES	YES	no	no	no	no
25,000 UGX	No	NO	NO	NO	NO	YES	no	no	no	no
Vehicle Characteristics										
Boarding Port	senyi	kiyindi	kiyindi	kiyindi	kiyindi	lyabana	lyabana	lyabana	senyi	senyi
Destination Port	lyabana	lyabana	lyabana	lyabana	lyabana	senyi	mayuge	lugazi	Lyabana	lyabana
Waiting Time at Boarding Port	0 hours 30 min	2hours 0 min	7hours	6hours30min	6hours 0min	N/A	N/A	N/A	0 hours 30 min	N/A
Travel Time	9 hours 0 min	8hours 30 min	8hours	7hours 30min	8hours 0min	5hours 30min	5hours30min	5hours	3 hours 0min	5hours 30 min
Travel Cost	37000 UGX	13 000	13 000	13 000	13 000	12 000	12 000	12 000	15 000	12 000
Type of Boat	cargo Boat	wooden transport boat	wooden transport boat	wooden transport boat	wooden transport boat	fishing vessel	fishing vessel	fishing vassel	Wooden boat	wooden boat
Ferry Company	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Boat Capacity	1 peson and 0 cars	28persons 0 cars	28 persons 0 caars	28 persons 0 cars	28 persons	2 ersons o cars	2 persons	2 persons	26 persons	26 persons
Boat Frequency	2 times per week	1 times per day	3times week	1 timesper day	1 time per day	1per day	1 time per week	N/A	4 times per week	4 times per week

Survey # Survey Question	11	12	13	14	15	16	17	18	19	20
Date & Time										
Landing Site	lyabana	lyabana	lyabana	lyabana	lyabana	lyabana	lyabana	lyabana	lyabana	lyabana
Date	18 03 2017	18 03 2017	18 03 2017	19 03 2017	18 03 2017	19 03 2017	1 9 03 2017	20 03 2017	19 03 2017	20 03 2017
Time	08 hours 27min	09hours 27min	09 hours 35min	09 hours 35min	10hours 12min	10hours 12min	10hours 25min	07 hours 12min	10hours 45min	07hours 32min
Person Characteristics										
Name	nicholas	mugaru john	mutesasira steven	kavuma richard	juliet	irene	sadic nsubuga	mukyala mulinda	nsereko	maama eddy
Sex	male	male	male	male	female	female	male	male	male	female
Salary	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Age	26	29	48	38	29	48	40	34	28	37
Occupation	business man	fisherman	fisherman	businessman	business woman	business woman	fisher man	Shop keeper	fisher man	shop keeper
Car possession	N0	N/A	no	NO	NO	NO	NO	NO	12 000 000	
Trip Characteristics										
Place of Origin	ngongwe	lyabana	kayunga	buvuma	lugazi	buvuma	natete	lyabana	kiyindi	lyabana
Destination	lyabana	kisenyi	lyabana	lyabana	lyabana	lyabana	lyabana	kampala	lyabana	lugazi
Vehicle 1	wooden boat	fishing vessel	taxi	cargo boat	taxi	truck	taxi	wooden boat	wooden boat	wooden boat
From - To	ngonngwe to ssenyi	lyabana to ssenyi	kayunga to lugazi	buvuma kirongo to lyabana	lugazi to senyi	buvuma to kirongo	natette to lugazi	lyabana to senyi	kiyindi to lyabana	lyabana to senyi
Vehicle 2	wooden boat	N/A	taxi		wooden boat	cargo boat	taxi	taxi	N/A	taxi
From - To	ssenyi to lyabana	N/A	lugazi to ssenyi		ssenyi to lyabana		lugazi to seny	ssenyi to lugazi	N/A	ssenyi to lugazi
Vehicle 3	N/A	N/A	wooden boat				wooden boat	taxi	N/A	taxi
From - To	N/A	N/A	ssenyi to lyabana	-			ssenyi to lyabana	lugazi to kampal	N/A	lugazi to kampala
Number of Interchanges	1	-	2	-	1	-	1	1	-	1
Purpose of travel	working	deliverying fish	fishing and business	business	business	business	fishing	shopping	fishing	shopping
Frequency of travel	2 times per week	5 times per week	4 times per month	2 times per month	2 times week	2 times per month	2 times week	2times per week	12 times per month	2 timesper month
Journey Time	4 hours	4hours 30min	8hours	8hours 0min	5hours omin	7hoours	6hours	6hours 30min	6 hours	7hours
Costs of Trip	20 000	25 000	22 000	30 000	15 000	500 000	25 000	25 000	12 000	18 000
Waiting Time at Interchange 1	N/A	N/A	3	N/A	N/A		N/A	2 hours		2hours
Waiting Time at Interchange 2	N/A	N/A	3				N/A	2 hours		2hours
Goods Characteristics										
Commodity 1	N/A	fish	fruits	firewood	N/A	charcal	N/A	N/A	N/A	N/A
Weight 1	N/A	9kg	basket	N/A	N/A	30sacks	N/A	N/A	N/A	N/A
Value 1	N/A	54 000	80 000	450 000	N/A	600 000	N/A	N/A	N/A	N/A
Commodity 2	N/A	N/A	N/A	timber	N/A	timber	N/A	N/A	N/A	N/A
Weight 2	N/A	N/A	N/A	N/A	N/A	400 000	N/A	N/A	N/A	N/A
Value 2	N/A	N/A	N/A	N/A	N/A	firewood	N/A	N/A	N/A	N/A
Commodity 3	N/A	N/A	N/A	N/A	N/A	100 000	N/A	N/A	N/A	N/A
Weight 3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Value 3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Commodity 4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Weight 4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Value 4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Commodity 5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Weight 5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Value 5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Commodity 6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Weight 6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Value 6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Weight	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Value	N/A	54 000	80 000	450 000	N/A	1 100 000	N/A	N/A	N/A	N/A
								N/A	N/A	N/A
Willingness to Pay 1										
5,000 UGX	yes	yes	yes	yes	yes	yes	yes	yes	yes	YES
10,000 UGX	no	yes	yes	yes	yes	yes	yes	yes	no	YES
15,000 UGX	no	yes	no	yes	yes	yes	no	no	no	NO
20,000 UGX	no	yes	no	no	no	yes	no	no	no	NO
25,000 UGX	no	yes	no	no	no	yes	no	no	no	NO
Willingness to Pay 2										
5,000 UGX	yes	yes	YES	YES	YES	YES	YES	YES	YES	YES
10,000 UGX	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
15,000 UGX	no	yes	no	yes	yes	yes	yes	yes	no	no
20,000 UGX	no	yes	no	yes	yes	yes	yes	yes	no	yes
25,000 UGX	no	no	no	no	no	yes	yes	no	no	no
Vehicle Characteristics			ssenyi							
Boarding Port	senyi	lyabana	kayunga	kirongo	senyi	kirongo	senyi	lyabana	kiyindi	lyabana
Destination Port	lyabana	ssenyi	lyabana	lyabana	lyabana	lyabana	lyabana	kampala	lyabana	lugazi
Waiting Time at Boarding Port	N/A	N/A	N/A	N/A	N/A		2houres	N/A	4hours	30 min
Travel Time	6hours	4hours 30min	8hours	9hours	6hoours		6hours	5hours	8hours	4hours
Travel Cost	12 000	15 000	12 000	30 000	12 000	180 000	12 000	12 000	13 000	12 000
Type of Boat	wooden boat	fishing boat	wooden boat	cargo boat	wooden boat	CARGO VESSEL	wooden boat	wooden transport	wooden boat	wooden boat
Ferry Company	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Boat Capacity	26 persons	1 person	26 persons	1 person	26 persons	1 person	26 PERSONS	49 persons	40 persons	49 persons
Boat Frequency		N/A	4 times per week	N/A	4 times per week	2 times week	4 TIMES WEEK	4 times week	N/A	4 times per week

Survey # Survey Question	21	22	23	24	25	26	27	28	29	30
Date & Time										
Landing Site	lyabana	lyabana	lyabana	lyabana	lyabana	lyabana	lyabana	lyabana	lyabana	lyabana
Date	20 03 2017	20 03 2017	21 03 2017	21 03 2017	21 03 2017	21 03 207	22 03 2017	22 03 2017	22 03 2017	23 03 2017
Time	07 hours 50min	08hours 18min	8hours 38min	09hours 08min	08hours 24min	10hours 0min	07 hours40min	08 hours 16min	08HOURS 311MIN	07hours15min
Person Characteristics										
Name	ssebirumbi jude	muzee kalinda	adam	kifuuko	okuru denis	opio john	nandawula max	olivia	Katogo	kato
Sex	male	mala	male	male	male	male	female	female	male	male
Salary	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Age	46	55	33	26	27	40	31	29	28	28
Occupation	fisher man	fisher man	business man	businesss man	business man	fisher man	business woman	-	fisherrman	fishing
Car possession	no			N/A	no	N/A	no		N/A	no
Trip Characteristics										
Place of Origin	lyabana	lyabana	lyabana	lyabana	lyabana	lyabana	lugazi	mukono	KAMPALA	lugazi
Destination	kampala	lugazi	kiyindi	kampala	kiyindi	kiyindi	lyabana	lyabana	LYABANA	lyabana
Vehicle 1	wooden transportboat	wooden transport boat	wooden transport boat	wooden boat	wooden boat	wooden boat	taxi	taxi	TAXI	taxi
From - To	lyabana to senyi	lyaban to senyi	lyabana to kiyindi	kiyindi to kampala	lyabana to kiyindi	lyabana to mwama	lugazi to senyi	mukono to lugazi	kampala to ssenyi	lugazi to senyi
Vehicle 2	taxi	taxi	N/A	N/A	N/A	wooden boat	wooden boat	taxi	WOODEN BOAT	wooden boat
From - To	ssennyi to kampala	ssenyi tolugazi	N/A	N/A	N/A	mwama to kiyind	ssenyi to lyabana	lugazi to ssenyi	ssenyi to lyabana	ssenyi to lya bana
Vehicle 3	N/A		N/A	N/A	N/A	N/A	N/A	wooden boat	N/A	N/A
From - To	N/A		N/A	N/A	N/A	N/A	N/A	ssenyi to lyabana	N/A	N/A
Number of Interchanges	1	1	-	-	-	-	1	1	1	1
Purpose of travel	selling fish	shopping	shopping	shopping	selling fish	fishing	selling clothes	selling clothes	SELLING SHOES	business
Frequency of travel	3times per week	3times per week	2 times month	N/A	2 times week	3 times week	3time week	N/A	N/A	3times per week
Journey Time	7hours	6hours30min	7hours	7hours 30min	8hours	7hours	5hours	9 hours	8HOURS	8hours 30min
Costs of Trip	20 000	17 000	13 000	20 000	13 000	24 000	25 000	35 000	25 000	16 000
Waiting Time at Interchange 1	N/A		N/A		35 min	N/A	N/A	N/A	2HOYURS 30MIN	N/A
Waiting Time at Interchange 2	N/A		N/A		N/A	N/A	N/A	N/A	N/A	N/A
Goods Characteristics										
Commodity 1	fish	N/A	N/A	N/A	sliver fish	fish	CLOTHES	CLOTHES	SHOES	N/A
Weight 1	50kg	N/A	N/A	N/A	216kgs	70kg	N/A		N/A	N/A
Value 1	300 000	N/A	N/A	N/A	129 600	420 000	600 000	750 000	350 000	N/A
Commodity 2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	JACKETS	N/A
Weight 2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	150 000	N/A
Value 2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Commodity 3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Weight 3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Value 3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Commodity 4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Weight 4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Value 4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Commodity 5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Weight 5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Value 5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Commodity 6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Weight 6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Value 6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Weight	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Value	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	300 000	N/A	N/A	N/A	129 600	420 000	600 000	750 000	500 000	N/A
Willingness to Pay 1										
5,000 UGX	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
10,000 UGX	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
15,000 UGX	YES	YES	NO	YES	YES	NO	YES	NO	YES	NO
20,000 UGX	YES	NO	NO	YES	NO	NO	NO	NO	NO	NO
25,000 UGX	NO	NO	NO	YES	NO	NO	NO	NO	NO	NO
Willingness to Pay 2										
5,000 UGX	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
10,000 UGX	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
15,000 UGX	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES
20,000 UGX	YES	YES	no	YES	YES	NO	NO	NO	YES	YES
25,000 UGX	YES	YES	NO	YES	YES	NO	NO	NO	NO	NO
Vehicle Characteristics										
Boarding Port	lyabana	lyabana	lyabna	lyabana	lyabana	lyabana	senyi	senyi	SENYI	SENYI
Destination Port	kampala	lugazi	kiyindi	kampala	kiyndi	kiyindi	lyabana	lyabana	LYABANA	LYABANA
Waiting Time at Boarding Port	2hours	1hours	N/A	1hours	40min	N/A	N/A	N/A	2HOURS 30MIN	N/A
Travel Time	4hours	4hours	N/A	N/A	8hours	8hours 30min	5HOOURS	5HOURS	5HOURS	5HOURS
Travel Cost	12 000	12 000	13 000	13 000	13 000	24 000	20 000	12 000	13 000	12 000
Type of Boat	wooden boat	wooden transport boat	wooden transport boat	wooden transport boat	wooden transport boat	wooden boat	WOODEN BOT	WOODEN BOAT	WOODEN BOAT	WOODEN BOAT
Ferry Company	N/A	N/A	n/a	N/A	n/a	N/A	N/a	N/A	N/A	N/A
Boat Capacity		49 persons	40 persons	40 persons	32 persons	32 persons	27 persons	27 persons	27 persons	28 PERSONS
Boat Frequency	3 times per week	4 times per week	3 times week	4 times perweek	3times per week	3times per week	4 times week	4 times week	3 times week	4 TIMES WEEK

Survey # Survey Question	31	32	33	34	35	36	37	38	39	40
Date & Time										
Landing Site	LYABANA	LYABANA	LYABANA							
Date	23 03 2017	23 03 2017	23 03 2017							
Time	08 HOURS 40 MIN	09HOURS 10MIN	09HOURS 55MIN							
Person Characteristics										
Name	mbuga	SHAKA	MAGGIE							
Sex	male	MALE	FEMALE							
Salary	N/A	N/A	NO							
Age	N/A	42	30							
Occupation	N/A	RELIGIOUS LEADER	BUSINESS WOMAN							
Car possession	N/A	YES	NO							
Trip Characteristics										
Place of Origin	LUGAZI	KAMPALA L	KAYUNGA							
Destination	LYABANA	LYABANA	LYABANA							
Vehicle 1	TAXI	TAXI	PICK UP CAR							
From - To	LYABANA TO SENYI	KAMPALA TO LUGAZI	KAYYUNGA TO SENYI							
Vehicle 2	WOODEN BOAT	TAXI	WOODEN BOAT							
From - To	N/A	LUGAZI TO SENYI	SSENYI TO LYABANA							
Vehicle 3	N/A	WOODEN BOAT	NLA							
From - To	N/A	SSENYI TO LYABANA	N/A							
Number of Interchanges	1	1	1							
Purpose of travel	TRADE	PREACHING THE GOSIPLE	BUSINESS							
Frequency of travel	N/A	2TIMES PER MOTH	1TIME PER WEEK							
Journey Time	N/A	8HOURS	8HOURS 30MIN							
Costs of Trip	28 000	25 000	200 000							
Waiting Time at Interchange 1	N/A	N/A	N/A							
Waiting Time at Interchange 2	N/A	N/A	N/A							
Goods Characteristics										
Commodity 1	BEANS	N/A	BANANA							
Weight 1	2500KGS	N/A	16 BANCHES							
Value 1	3 750 000	N/A	280 000							
Commodity 2	N/A	N/A	N/A							
Weight 2	N/A	N/A	N/A							
Value 2	N/A	N/A	N/A							
Commodity 3	N/A	N/A	N/A							
Weight 3	N/A	N/A	N/A							
Value 3	N/A	N/A	N/A							
Commodity 4	N/A	N/A	N/A							
Weight 4	N/A	N/A	N/A							
Value 4	N/A	N/A	N/A							
Commodity 5	N/A	N/A	N/A							
Weight 5	N/A	N/A	N/A							
Value 5	N/A	N/A	N/A							
Commodity 6	N/A	N/A	N/A							
Weight 6	N/A	N/A	N/A							
Value 6	N/A	N/A	N/A							
Total Weight	N/A	N/A	N/A							
Total Value	N/A	N/A	N/A							
	3 750 000	N/A	280 000							
Willingness to Pay 1										
5,000 UGX	YES	YES								
10,000 UGX	YES	YES	YES							
15,000 UGX	NO	YES	YES							
20,000 UGX	NO	YES	YES							
25,000 UGX	NO	YES	NO							
		YES	NO							
Willingness to Pay 2										
5,000 UGX	YES	YES	YES							
10,000 UGX	YES	YES	YES							
15,000 UGX	YES	YES	YES							
20,000 UGX	YES	YES	NO							
25,000 UGX	YES	YES	NO							
Vehicle Characteristics										
Boarding Port	SENYI	SENYI	SENYI							
Destination Port	LYABANA	LYABANA	LYABANA							
Waiting Time at Boarding Port	N/A	N/A	N/A							
Travel Time	N/A	6HOURS	6HOURS							
Travel Cost	20 000	12 000	20 000							
Type of Boat	WOODEN BOAT	WOODEN BOAT	WOODENN BOAT							
Ferry Company	N/A	N/A	N/A							
Boat Capacity	28 PERSONS	28 PERSONS	28 PERSONS							
Boat Frequency	4 TIMES WEEK	4 TIMES WEEK	4 TIMES WEEK							

Appendix VII Preliminary ESIA

1. INTRODUCTION

This Environmental and Social Impact Assessment (ESIA) is part of the larger Lake Victoria Transport Study which is aimed at identifying critical environmental and social risks that may affect the potential projects. Data has been collected about the proposed sites through interviews guided by a checklist and observations. The data has been analyzed to ascertain the environmental and social impacts that may arise as a result of these proposed activities. The next section contains the findings with regard to each of the proposed sites.

2. DETAILED DESCRIPTION OF ENVIRONMENTAL AND SOCIAL IMPACT ASPECTS OF PROPOSED DEVELOPMENT SITES

2.1 MASESE LANDING SITE

The proposed activities at Masese Landing site in Jinja District, Eastern Uganda under the Lake Victoria Transport Program include development of: (i) A paved waiting area of approximately 10 acres, (ii) A small RoRo Pier, (iii) A ticketing office and toilets, and (iv) Awning for waiting passengers.

The proposed developments fall within the boundaries of the Beach Management Unit (BMU) close to Masese Fish Landing site. The Masese Beach Management Unit is headed by Mr. Majid Magumba.

The Beach Management Unit area (land area) is approximately eight hectares and several activities take place under this Beach Management Unit jurisdiction but the ownership of the land is by Jinja Municipal Council. The most dominant activities include:

(1) Fish landing site and fish marketing,
(2) Water transport service to several islands on Lake Victoria in the Jinja/Buikwe area and even to distant places like Mayuge, Kalangala, Namayingo, Busia and Mukono.
(3) Wooden boats manufacture and maintenance,
(4) Small scale trading activities in clothing, charcoal, and other manufactured goods
(5) Vehicle washing,
(6) Subsistence agriculture including growing of crops and rearing of animals such as goats

Masese Landing Site has witnessed transformations over the last two decades or so. The actual site for the proposed development sits on public land which is owned by Jinja Municipal Council and it includes abandoned structures that were used for docking. As shown in Figures 1, 2, 3 and 4, two structures are dominant: (1) for anchoring the ferry once it landed; and (2) mud and earth surface for vehicle parking.

It must be emphasized that much of the actual site for the proposed developments is devoid of any serious activities. Officials of Masese Beach Management Unit (BMU) indicated that the area for the proposed site is already reserved for the proposed developments and therefore have no reservations whatsoever in having the envisioned/proposed development in place. There would be no interference whatsoever in further developing the site except that the access road on both sides of the access road is lined with a market area that is run by the Beach Management Unit, under Jinja Municipal Council planning and revenue guidance. With proper planning and reorganization of the bigger market area, an estimated 60 vendors that occupy the sides of the access road to the envisioned development can be relocated to the upper side of the landing site.


Figure 1. Proposed pier, car park and passenger waiting area at Masese Landing Site


Figure 2. Proposed site for Masese Landing Site

Figure 3. Existing docking area (pier) at the proposed site for Masese Landing Site

Figure 4. Existing structures at the proposed ticketing office and road to pier in the background while the foreground shows the proposed vehicle parking and passenger waiting area at Masese Landing Site

Figure 5 and Table 1 present other details about the developments at Masese Landing Site.

Type of land at the exact project development area

- Proposed pier area - Dominated by sand and rocks and its is about 15 metres to get to the 2m water depth
- Proposed waiting area - Is dirt (murram) underlain with rocky surfaces
- Proposed passenger waiting area - Is dirt (murram) underlain with rocky surfaces
- Proposed ticketing office area - Is also dirt (murram) underlain by firm rocky surface. It is partially developed with a market which has temporary structures of iron sheets and wood off-cuts

Type and amount of vegetation

- Proposed pier area - Nearly bare ground
- Proposed waiting area - Bare ground
- Proposed passenger waiting area - Bare ground
- Proposed ticketing office area - Bare ground

Type and amount of animals

- The site for the proposed development has for long been under several and multiple development projects and our observations revealed that there are no animals whatsoever except for a limited set of domestic animals such as goats and cows which keep roaming the market area. In fact, the head of the Beach Management Unit has established a goat enterprise in an enclosure close to the market area.

Figure 5. Details about proposed developments at Masese Landing Site.

The actual site for the proposed development is generally devoid of any inhabitants and structures except for the proposed ticketing office area where there are some few temporary structures. All human operations and activities at the proposed development site only occur during day and the intensity of these activities can only be observed only at the landing site, the surrounding market area and access road.

Table 1. Details about the developments at Masese Landing Site.

	Inhabitants	Structures	Sources of water and air pollution	Items with cultural & heritage value
Pier Area	None	None	Runoff and sediments from the proposed vehicle parking and pasenger waiting area	None
Vehicle parking area	None	None	Runoff and sediments from the access road and surrounding properties	None
Passenger Waiting Area	None	Crane that supported previous water vessels that operated in the area and closed about 1997/98	Runoff and sediments from the access road and surrounding properties	None
Ticketing Area	Yes	Temporary wood and iron sheet structures forming part of the market area	• Solid waste from the market area • Erosion and silt from the surrounding landscape & access road • Oil spills from motor boats	None

There are no items with a cultural or heritage value that could be observed or reported by the Beach Management Unit officials. However,, there are several sources of actual and potentia pollution that we observed at the site.These include poor management of waste from the market, oil spills, waste from animals, and erosion among others.

2.2 JINJA PORT

Although the port seemingly appears abandoned, one would observe some water transport services that are operational at the site. It should be noted that Jinja Port is an established port as it is still the largest port in Uganda. The land on which it is located is owned by Uganda Railways Corporation. Without any encumbrances, there is sufficient land and what is only required is its upgrading, including modernization, navigation aid, dredging and sedimentation protection as there is already existing infrastructure (Figure 6). The environmental and social conditions (Figure 7) also need to be addressed so as it make it environmentally sound.

For the most part, the port area is very quiet and business is low. The Pier was rendered redundant in the early 1990s after Uganda Revenue Authority temporarily centralized cargo clearance, forcing businessmen to channel their imports through Port Bell in Kampala. Information from the Port Clerk indicated that the existing activities at the site include:
(i) Marine operations run by:

a. BIDCO to transport its raw materials from Ssese Islands to Jinja for its industrial operations
b. Uganda Police Force - Marine Police operations
c. Ministry of Agriculture, Animal Industry and Fisheries – Fisheries Department's Marine operations

(ii) Small agricultural activities undertaken by Uganda Railways Corporation staff on surrounding presumably redundant land.

Figure 6. Infrastructure at the Jinja Port

Figure 7. Environmental conditions at Jinja Port

Tables 2 and 3 present the environmental and social characteristics of Jinja Port.

Table 2. Environmental and social characteristics of Jinja Port

	Type of land at the proposed development area	Type and amount of vegetation	Type and amount of animals
Pier Area		None	None
Vehicle parking area	Dirt and silt underlain by concrete foundation	Shoreline wetland vegetation	None
Passenger Waiting Area	Dirt	Shoreline wetland vegetation	None
Ticketing Area	Dirt	Shoreline wetland vegetation	None

Table 3. Other environmental and social characteristics of Jinja Port

	Inhabitants	Structures	Sources of water and air pollution	Items with cultural & heritage value
Pier Area	None	None	Engine oils	None
Vehicle parking area	None	None	Runoff and sediments from the main marram road and agricultural fields	None
Waiting Area	None	None	Runoff and sediments from the main marram road and agricultural fields	None
Ticketing Area[41]	Yes	None	Runoff and sediments from the main marram road and agricultural fields	None

[41] There is a need for an office area since it is a requirement that all passengers on UNRA ferries must be registered. The ticketing area could also perform multiple functions; for ticketing and passenger registration as well.

A mixture of Marine Police and Fisheries Research Institute Vessels at Jinja Port

2.3 KIYINDI LANDING SITE

The proposed activities at Kiyindi Landing site in Buikwe District, Central Uganda under the Lake Victoria Transport Program include development of: (i) A paved waiting area of approximately 10 acres, (ii) Redevelopment of a small RoRo Pier, (iii) A ticketing office and toilets, and (iv) Awning for waiting passengers.

The proposed development exclusively lies outside the Beach Management Area. Indeed, the envisioned Kiyindi development is part of the large Kiyindi Ferry and infrastructure that provide daily services to Buvuma Island, one of the island districts in Uganda.

There are two major challenges over the proposed development:

(1) There are multiple claims of ownership over the land where the envisioned development is planned. However, all indications are that for many years, the land is recognized to belong to Uganda National Roads Authority which has operated there for many years.

(2) The multiple docking areas that were observed indicate that there is variability in water levels at the envisioned development site (Figures 8, 9, 10, 11 and 12). The original docking area (Figure 2) has been abandoned and multiple areas have been redeveloped to sustain ferry operations to Kirondo Landing Site on Buvuma Island. As one might clearly see in Figures 11 and 12, the current operational area is typically not permanent as it consists of mainly mud and some rocks.

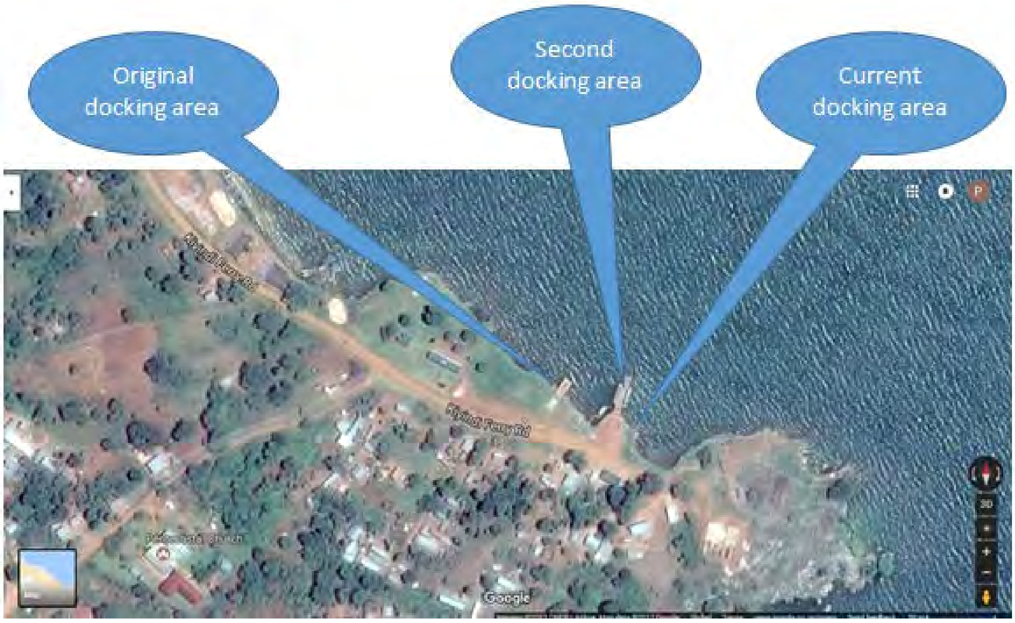


Figure 8. Shifting docking areas at Kiyindi Landing Site

Figure 9. The original docking area for Kiyindi ferry – The exact spot for the envisioned development - (now abandoned because of low water levels)

Figure 10. The second docking area (now abandoned) for Kiyindi-Buvuma ferry

Figure 11. The current docking area at Kiyindi Landing Site

Figure 12. Current docking area at Kiyindi Landing Site relative to the second and original docking areas

Tables 4 and 5 present the environmental and social characteristics of Kiyindi Landing Site.

Table 4. Environmental and social characteristics of Kiyindi Landing Site

	Type of land at the proposed development area	Type and amount of vegetation	Type and amount of animals
Pier Area	Already developed but requires improvements	Grasses	None
Vehicle parking area	Grass underlain by rocks	Grasses	None
Passenger Waiting Area	Grass underlain by rocks	Grasses	None
Ticketing Area	Grass underlain by rocks	Grasses	None

Table 5. Other environmental and social characteristics of Kiyindi Landing Site

	Inhabitants	Structures	Sources of water and air pollution	Items with cultural & heritage value
Pier Area	None	Abandoned pier area (See Figure 2)	Runoff from the access road, buildings and surrounding agricultural lands	None
Vehicle parking area	None	Vacant	Runoff from the access road, buildings and surrounding agricultural lands	
Waiting Area	None	Vacant	Runoff from the access road, buildings and surrounding agricultural lands	None
Ticketing Area[42]	None	Vacant	Runoff from the access road, buildings and surrounding agricultural lands	None

2.4 KATOSI

[42] There is a need for an office area since it is a requirement that all passengers on UNRA ferries must be registered. The ticketing area could also perform multiple functions; for ticketing and passenger registration as well.

The proposed activities at Katosi Landing Site in Mukono District, Central Uganda under the Lake Victoria Transport Program include development of: (i) A small RoRo Pier, (iii) A ticketing office and toilets, and (iv) Awning for waiting passengers.

The proposed development exclusively lies on 8-hectare piece of land, whose ownership is claimed by a one Mr. Samuel Wantaate and it largely outside the recognized Beach Management Unit Area of Katosi. As seen in Figures 13 and 14, the envisioned development is exclusively a rocky outcrop (a ridge) protruding into Lake Victoria.

Figure 13. The proposed development site at Katosi Landing Site

Figure 14. The proposed development site at Katosi Landing Site

The envisioned development[43] site is devoid of any significant developments and although the land owner expressed interest in releasing the land for government use, the rocky outcrop would pose one major challenges over the proposed development:

(1) It may require significant excavation to create a functional ferry system and associated infrastructure;
(2) The rocky outcrop also acts as a cultural site to which local communities and Balangira of Buganda pay homage to, occasionally each year.

[43]The envisioned development doesn't indicate the need for a vehicle parking area but the community members indicated that since Ddamba Island to which the main connection from Katosi is intended has a significant vehicle population and many persons have been attracted to the island, there is a need to include a vehicle parking area in the envisioned development of Katosi.

Tables 6 and 7 present the environmental and social characteristics of Katosi Landing Site.

Table 6. Environmental and social characteristics of Katosi Landing Site

	Type of land at the proposed development area	Type and amount of vegetation	Type and amount of animals
Pier Area	Rock outcrop	Scanty	None observed
Passenger Waiting Area	Rock outcrop	Scanty	None observed
Ticketing Area	Rock outcrop	Scanty	None observed

Table 7. Other environmental and social characteristics of Katosi Landing Site

	Inhabitants	Structures	Sources of water and air pollution	Items with cultural & heritage value[44]
Pier Area	None	Vacant	Runoff and sediments from surrounding fish drying grounds	Yes
Passenger Waiting Area	None	Vacant	Runoff and sediments from surrounding fish drying grounds	Yes
Ticketing Area[45]	None	Small housing structure	Runoff and sediments from surrounding fish drying grounds	

2.5 GGABA LANDING SITE - KAMPALA

The proposed activities at Ggaba Landing Site in Kampala District, Central Uganda under the Lake Victoria Transport Program include development of: (i) A small RoRo Pier, (iii) A ticketing office and toilets, and (iv) Awning for waiting passengers.

The proposed development site lies very close to National Water and Sewerage Corporation (NWSC) water works and with a larger section within the enclosure of NWSC. However, the proposed development site is, for the most part, part of the gazetted wetland area by National Environment Management Authority (NEMA). It thus means that any developments will involve negotiations with both NWSC and NEMA (Figure 15).

[44] The whole rock outcrop is a cultural area while on the eastern side of the proposed development site, a beach seem to be emerging and our observation is that it is a big attraction for a bigger local population to engage in beach related activities.

[45] There is a need for an office area since it is a requirement that all passengers on UNRA ferries must be registered. The ticketing area could also perform multiple functions; for ticketing and passenger registration as well.

Figure 15. Marshland/Wetland vegetation together with a Eucalyptus plantation at the proposed site in Ggaba.

The southern section of the proposed development site (proposed RoRo pier) lies in an inhabited area, Katoogo zone, which is a densely populated parish in Ggaba parish (Figure 16). It appears that this community encroached on the wetland and has intensively settled on it and therefore some forms of relocation of the aforementioned families would be required.

Figure 16. NWSC facility bordered by Parts of Katoogo parish which is expected to be affected by the envisioned development

Tables 8 and 9 present the environmental and social characteristics of Ggaba Landing Site.

Table 8. Environmental and social characteristics of Ggaba Landing Site

	Type of land at the proposed development area	Type and amount of vegetation	Type and amount of animals
Pier Area	Heavily settled wetland area	Marshland/wetland	Small bird population (weaver birds)
Vehicle parking area	Wetland	Marshland/wetland (gazetted)	No observation made
Passenger Waiting Area	Wetland	Open marshland with trees (Eucalyptus Plantation)	No observation made
Ticketing Area	Wetland	Open marshland with trees (Eucalyptus Plantation)	No observation made

Table 9. Other environmental and social characteristics of Ggaba Landing Site

	Inhabitants	Structures	Sources of water and air pollution	Items with cultural & heritage value
Pier Area	Heavily settled	Existing residential structures	Domestic waste from Katoogo parish	None
Vehicle parking area	None	Vacant	None	None
Waiting Area	None	Vacant	None	None
Ticketing Area[46]	None	Vacant	None	None

2.6 PORT BELL - KAMPALA

Port bell together with Jinja Port are considered as the most developed port areas in Uganda. The port lies on a large piece of land of over 5 acres under the direct control and management of Uganda Railways Corporation. Given that it is also Uganda's international port, it has facilities for an Immigration Department/Office and Police Station. Figure 17 shows its layout.

Figure 17. Layout of Port Bell Port.

[46] There is a need for an office area since it is a requirement that all passengers on UNRA ferries must be registered. The ticketing area could also perform multiple functions; for ticketing and passenger registration as well.

The port was well developed and thus equipped with a lot of infrastructure. However, following decades of abandonment and neglect, most port infrastructure including the floating dock, lifting crane and buildings have decayed and thus require urgent redevelopment or renovation (Figures 18, 19, 20, 21, 22, 23 and 24). This will also play a role in improving the environmental and social conditions at the port which are currently wanting.

Figure 18. The floating dock

Figure 19. Existing parking yard at Port Bell


Figure 20. Abandoned rail tracks and ships (background)


Figure 21. Abandoned tug boat at Port Bell


Figure 22. The Water Hyacinth Harvesters at Port Bell

Figure 23. Abandoned ship and other infrastructure at Port Bell

Figure 24. Road and parking yard conditions at Port Bell

Port Bell, was once served by five wagon ferries, carrying as much as 45,000 tons per month. Currently, the port mainly serves small private boats carrying fuel and general cargo. The MV Umoja (a Tanzanian ferry) operates only occasionally on special charter. This situation is poised to change after the rehabilitation of the MV Kaawa. Uganda's remaining three giant wagon ferries are currently grounded, pending rehabilitation. MV Kaawa is being refurbished and the works began with the rehabilitation of the dry dock at a cost of about sh7b. The works on this ferry are expected to be finished soon. Later, it will be taken off the dock to the water for testing to assess whether it conforms to seaworthiness.
Tables 9 and 10 present the environmental and social characteristics of Port Bell.

Table 9. Environmental and social characteristics of Port Bell.

	Type of land at the proposed development area	Type and amount of vegetation	Type and amount of animals
Pier Area	Rocky and Sandy	None	None
Vehicle parking area	Dirt and tarmac	None	None
Passenger Waiting Area	Dirt and tarmac	None	None

Ticketing Area	Dirt and tarmac	None	None

Table 10. Other environmental and social characteristics of Port Bell.

	Inhabitants	Structures	Sources of water and air pollution***	Items with cultural & heritage value
Pier Area	None	None	Limited sources of erosion except for runoff and sediments	None
Vehicle parking area	None	None	Limited sources of erosion except for runoff and sediments	None
Waiting Area	None	None	Limited sources of erosion except for runoff and sediments	None
Ticketing Area[47]	None	None	Limited sources of erosion except for runoff and sediments	None

*** Two significant challenges can be observed at Port Bell notably:

(1) The floating island (Figure 17) which is visible on the eastern side of the port is a threat to the smooth operation of the port related activities. For the last three years, the floating island has been a menace to port operations;

(2) The rapid growth, movement and collection of water hyacinth around the port requires expensive equipment to be cleared regularly. Indeed, there is water hyacinth harvesting equipment at the port brought by Egyptian Government to the port to ensure and sustain the clearing of water hyacinth from Lake Victoria.

2.7 NAKIWOGO LANDING SITE - KAMPALA

Nakiwogo is an area that has for a long time operated a ferry to Kalangala District (Ssese Islands) and South Western parts of Wakiso District at Kyanvubu. There are two functional facilities at Nakiwogo: (1) commercial ferry docking area that operates to Ssese Islands; and (2) the Uganda National Roads Authority (UNRA) ferry that operates daily services to Kyanvubu Landing Site (Figure 25).

Figure 25. Docking areas for Kyanvubu and Ssese Islands ferries

Figures 26, 27, 28, 29 and 30 show the existing pier areas at Nakiwogo Landing Site.

[47] There is a need for an office area since it is a requirement that all passengers on UNRA ferries must be registered. The ticketing area could also perform multiple functions; for ticketing and passenger registration as well.

Figure 26. Road access to both the commercial (Ssese Islands) pier on the left and free (Kyanvubu) pier on the right.


Figure 27. Car park at Nakiwogo Landing Site.


Figure 28. Existing pier area for Commercial ferry to Ssese Islands at Nakiwogo Landing Site

Figure 29. Ticketing and Booking Area at Nakiwogo Landing Site

Figure 30. Private motor boats at Nakiwogo Landing Site which are used especially when the other ferries are not readily available.

The land at Nakiwogo belongs to the Uganda Government and it is administered by Entebbe Municipal Council. The envisioned development would therefore have no problems, whatsoever, in making further development at the site. The northern and north-eastern parts adjacent area to the envisioned development site are, however, occupied by a landing site that is dominated by active transport and fishing canoes, and a market area for charcoal and wood (Figure 31).

Figure 31. Other activities close to Nakiwogo Landing Site

The access road is, by and large narrow while the southern areas adjacent to the envisioned development site is occupied by a private facility and performs multiple roles as an eating facility, resting and waiting area for passengers and leisure park for local residents.

The Lake Victoria water levels at Nakiwogo landing site frequently fluctuate leading to the landing facility submerging. When the water levels rise, there is increasing difficulty in disembarking at the dock. Formerly, the passengers were passing through water to board or disembark the vessel with the raised water levels as a result of the recent heavy downpours. There is frequent damage to the raised concrete floor on the dock and travelers risk sliding and drowning into the lake. Attempts have been made to raise the facility through adding marram and hardcore stone and the edging to avoid further deterioration for smooth flow of passengers and vehicles to and from the vessel. What could be observed was that there is a need for frequent maintenance of the facility.

Tables 11 and 12 present the environmental and social characteristics of Nakiwogo Landing Site

Table 11. Environmental and social characteristics of Nakiwogo Landing Site

	Type of land at the proposed development area	Type and amount of vegetation	Type and amount of animals
Pier Area	Dirt/Murram and hard core stone	None	None
Vehicle parking area	Dirt	None	None
Passenger Waiting Area	Dirt	None	None
Ticketing Area	Dirt	None	None

Table 12. Other environmental and social characteristics of Nakiwogo Landing Site

	Inhabitants	Structures	Sources of water and air pollution	Items with cultural & heritage value
Pier Area	None	Present	Runoff	None
Vehicle parking area	Yes	A mixture of permanent and semi permanent structures	Runoff and sediments from surrounding areas	None
Waiting Area	Yes	A mixture of permanent and semi permanent structures	Runoff and sedimentation from surrounding areas	None
Ticketing Area[48]	Yes	A mixture of permanent and semi permanent structures	Runoff and sedimentation from surrounding areas	None

2.8 KYANVUBU LANDING SITE – WAKISO DISTRICT

The envisioned development at Kyanvubu is part of the current direct ferry link to Nakiwogo in Entebbe. It sits on Mailo land that is under the direct ownership and stewardship of Buganda Kingdom. It already has been developed with a passenger waiting area and car parking area. However, there is no ticketing office (Figure 32).

Figure 32. Kyanvubu Landing Site and Ferry Site

Tables 13 and 14 present the environmental and social characteristics of Kyanvubu Landing Site.

Tables 13. Environmental and social characteristics of Kyanvubu Landing Site.

	Type of land at the proposed development area	Type and amount of vegetation	Type and amount of animals
Pier Area	Dirt/Murram	None	None
Vehicle parking area	Dirt/Murram	None	None
Passenger Waiting Area	Dirt/Murram	None	None

[48] There is a need for an office area since it is a requirement that all passengers on UNRA ferries must be registered. The ticketing area could also perform multiple functions; for ticketing and passenger registration as well.

Ticketing Area[49]	Not indicated on the proposed plan	-	-

Tables 14. Other environmental and social characteristics of Kyanvubu Landing Site.

	Inhabitants	Structures	Sources of water and air pollution	Items with cultural & heritage value
Pier Area	None	None	Runoff and sediments from surrounding hills and murram roads	None
Vehicle parking area	None	None	-do-	None
Waiting Area	None	None	-do-	None
Ticketing Area[50]	Not indicated in the proposed plan	Not envisioned in the proposal	-do-	None

2.9 KIGUNGU - ENTEBBE

The envisioned development site is sandwiched on all sides by the Dairy Farming Institute, Ministry of Agriculture, Animal Industry and Fisheries and Civil Aviation Authority/Entebbe Airport expansion and Lake Victoria. As shown in Figures 33,34 and 35, it does not have any developments. The only activities observed were attempts to use for agriculture but also as a recreational area with some small scale fishing activities.

Figure 33. The proposed site at Kigungu

[49] Although the envisioned development doesn't include a ticketing, it was important to the Police Office that a ticketing/registration area is planned for in Kyanvubu. One other suggestion by the Police Officer and given UNRA guidelines for operations of ferry services across the country were that the passenger waiting area could be expanded to include a ticketing area as well.

[50] There is a need for an office area since it is a requirement that all passengers on UNRA ferries must be registered. The ticketing area could also perform multiple functions; for ticketing and passenger registration as well.


Figure 34. The proposed site at Kigungu


Figure 35. The proposed site at Kigungu

The proposed development site is a contested area. There are many claims to the land and while the CAA claims to have obtained the land title from the Uganda Land Commission in 2003; the CAA on the other hand is implicated in the fraudulent procurement of the title from Uganda Land Commission. Civil Aviation Authority officials say the land in question belongs to the authority and it is part of the land earmarked for the expansion of the airport. Lawyers of Arcadia Advocates and Akampulira and Co Advocates led by Fox Odoi have filed a court injunction to restrain Civil Aviation Authority from encroaching on the land belong to the Buganda Kingdom's Mmamba-Kakoboza clan.

The clan members accuse CAA of trying to *grab* their 68 acre piece of *land*. The land in contention is the seat of a Buganda kingdom cultural site belonging to the Mmamba Kakoboza clan. In fact, the name Entebbe is derived from the chair of the head of the Mmamba clan in Buganda Kingdom. There has been a heavy police presence as officials from CAA mapped the land. But a chief of the Mmamba-Kakoboza clan, Charles Musisi Mugula, insists that the land belongs to the clan. He argues that it was acquired centuries ago and says they have a land title to back their claim.

Tables 15 and 16 present the environmental and social characteristics of Kigungu Site.

Tables 15. Environmental and social characteristics of Kigungu Site.

	Type of land at the proposed development area	Type and amount of vegetation	Type and amount of animals
Pier Area	Rock	None	None
Vehicle parking area	Rocky area	Short grasses	None
Passenger Waiting Area	Rocky area	Short grasses	None

Ticketing Area	Rocky area	Short grasses	None

Tables 16. Other environmental and social characteristics of Kigungu Site.

	Inhabitants	Structures	Sources of water and air pollution	Items with cultural & heritage value
Pier Area	None	None	None	None
Vehicle parking area	None	None	None	None
Waiting Area	None	None	None	None
Ticketing Area[51]	None	None	None	None

2.10 BUWANZI LANDING SITE

The actual site for the envisioned development lies largely in an agricultural area. Reports indicate that the land has been sold to BIDCO (Uganda) Limited; part of BIDCO Africa; previously Bidco Oil Refineries Limited. This is a multinational consumer goods company headquartered in Thika, Kenya with subsidiaries and distributorships across 16 countries in East, Central and Southern Africa. Its products include edible oils, fats, margarine, laundry bars and detergents, personal care products, and animal feeds. BIDCO Africa owns over 40 brands and is the largest producer, marketer, and retailer of consumer goods in the region.

Tables 17 and 18 present the environmental and social characteristics of Buwanzi Landing Site.

Tables 17. Environmental and social characteristics of Buwanzi Landing Site.

	Type of land at the proposed development area	Type and amount of vegetation	Type and amount of animals
Pier Area	Wetland vegetation	Marshland/Wetland	None
Vehicle parking area	Agricultural land with scattered trees	Scattered trees	None
Passenger Waiting Area	Open ground	Cultivated land	None
Ticketing Area	Open ground	Cultivated land	None

Tables 18. Other environmental and social characteristics of Buwanzi Landing Site.

	Inhabitants	Structures	Sources of water and air pollution	Items with cultural & heritage value
Pier Area	None	None	Runoff from agricultural land	None
Vehicle parking area	None	None	Runoff from agricultural land	None
Waiting Area	None	None	Runoff from agricultural land	None
Ticketing Area	None	None	Runoff from agricultural land	None

2.11 ZINGOOLA LANDING SITE

[51] There is a need for an office area since it is a requirement that all passengers on UNRA ferries must be registered. The ticketing area could also perform multiple functions; for ticketing and passenger registration as well.

Zingoola landing Site is located in Mukono District. Information acquired indicates that it is located on Mailo land but with so many people settled on it. Tables 19 and 20 present the environmental and social characteristics of Zingoola Landing Site.

Tables 19. Environmental and social characteristics of Zingoola Landing Site.

	Type of land at the proposed development area	Type and amount of vegetation	Type and amount of animals
Pier Area	Open water	Open water	None reported
Vehicle parking area	Dirt/Open land	Open land	None reported
Passenger Waiting Area	Dirt/Open land	Open land	None reported
Ticketing Area	Dirt/Open land	Open land	None reported

Tables 20. Other environmental and social characteristics of Zingoola Landing Site.

	Inhabitants	Structures	Sources of water and air pollution	Items with cultural & heritage value
Pier Area	None	None		
Vehicle parking area	None	None		
Waiting Area	None	None		
Ticketing Area	None	None		

2.12 NAMONI LANDING SITE, MAYUGE

The envisioned development is located in community agricultural fields and as described in the National Physical Planning Standards and Guidelines (2011), the land should be left without any community developments.

However, the area surrounding the envisioned site is a heavily cultivated landscape and for many years, many farming households claim ownership over the agricultural land. The site is devoid of any structure and the only potential pollution in the area would come from cultivated agricultural lands. Tables 21 and 22 present the environmental and social characteristics of Namoni Landing Site.

Tables 21. Environmental and social characteristics of Namoni Landing Site.

	Type of land at the proposed development area	Type and amount of vegetation	Type and amount of animals
Pier Area	Dirt and rock		None
Vehicle parking area	Dirt and rock	Very scanty vegetation	None
Passenger Waiting Area	Dirt and rock	Very scanty vegetation	None
Ticketing Area	Dirt and rock	Very scanty vegetation	None

Tables 22. Other environmental and social characteristics of Namoni Landing Site.

	Inhabitants	Structures	Sources of water and air pollution	Items with cultural & heritage value
Pier Area	None	Open water	Runoff and sediments from surrounding crop field	None

Vehicle parking area	None	None	Runoff and sediments from surrounding crop field	None
Waiting Area	None	None	Runoff and sediments from surrounding crop field	None
Ticketing Area	None	None	Runoff and sediments from surrounding crop field	None

2.13 BWONDHA, MAYUGE

Bwondha is the biggest landing site in Mayuge District. The proposed development is situated close to an ice plant (fish handling facility) cum cold stores established in Bwonda, one of the biggest Nile Perch (fish) landing sites on Lake Victoria. Other activities at the proposed site include:

(1) Fishing landing site activities
(2) Market (Figure 36)
(3) Ice-plant for Nile Perch
(4) Boat repair and manufacture

Figure 36. Market stalls at Bwondha Landing Site

Tables 22 and 23 present the environmental and social characteristics of Bwondha Landing Site.

Tables 22. Environmental and social characteristics of Bwondha Landing Site

	Type of land at the proposed development area	Type and amount of vegetation	Type and amount of animals
Pier Area	Open water	None	None

Vehicle parking area	Murram/Dirt	None	None
Passenger Waiting Area	Murram/Dirt	None	None
Ticketing Area	Dirt/Murram	None	None

Tables 23. Other environmental and social characteristics of Bwondha Landing Site

	Inhabitants	Structures	Sources of water and air pollution	Items with cultural & heritage value
Pier Area	None	A pier for docking of fishing boats exists	Runoff and sediments from surrounding properties and roads	None
Vehicle parking area	None	Vacant but too small for a vehicle parking area	Runoff and sediments from surrounding properties and roads	None
Waiting Area	None	None	Runoff and sediments from surrounding properties and roads	None
Ticketing Area	None	Very close to the existing market	Runoff and sediments from surrounding properties and roads	None

A floating Island that frequently drifts in Lake Victoria does affect fishing operations at Bwondha landing site too. The District Fisheries Officer indicated that the floating island drifted into Bwondha area in June 2016 and seems to have been stabilized about 15km to the landing site.

2.14 GOROFA, LOLWE (DOLWE) ISLAND, NAMAYINGO

According to the District Fisheries Officer, Gorofa is the biggest fishing settlement and one of the densely populated islands and this is most pronounced at the landing site; the area selected for the envisioned development. It is considered an archeological site and the landscape is generally rock (Figures 37 and 38).

Figure 37. Rocky landscape of Gorofa Landing Site

Figure 38. Surrounding environmental conditions in Lolwe Island

Local communities claim ownership of the land but according to the District Fisheries Officer, all land 200 meters away from a water body belongs to the Government of Uganda. The 200 meters are the recommended buffer distances for environmental management of lake shores defined in the Uganda National Physical Planning Standards and Guidelines (2011). Tables 24 and 25 present the environmental and social characteristics of Gorofa Landing Site.

Tables 24. Environmental and social characteristics of Gorofa Landing Site

	Type of land at the proposed development area	Type and amount of vegetation	Type and amount of animals
Pier Area	Open water	None	None
Vehicle parking area	Rocky surface	None	None
Passenger Waiting Area	Rocky surface	Limited vegetation but some eucalyptus trees found	None
Ticketing Area	Rocky surface	Limited vegetation but some eucalyptus trees found	None

Tables 25. Other environmental and social characteristics of Gorofa Landing Site

	Inhabitants	Structures	Sources of water and air pollution	Items with cultural & heritage value**
Pier Area	Open water	No structures – open water	Residential and fish waste	Yes
Vehicle parking area	n/a	n/a	Limited	Yes
Waiting Area	Heavily settled by fishers	Rocky surface***	Limited	Yes
Ticketing Area	Heavily settled by fishers	Rocky surface – but settled by fishers	Limited	Yes

** - Lolwe island is considered an archaeological treasure - archaeological resource and the proposed development draws attention to the significant threats that the island faces. The District Fisheries Officer indicated that the archaeological landscape on Lolwe is significantly richer than previously thought and that through sustained investigation, it may be possible to assess regional interactions across Lake Victoria over several millennia.
*** - The rocky environment will require significant excavation and levelling for the envisioned development

2.15 BUVUMA ISLAND LANDING SITE, BUVUMA

Buvuma Island Landing Site is the main link of Buvuma Island to the mainland through Kiyindi Landing Site. The proposed activities at Buvuma Island Landing Site under the Lake Victoria Transport Program include development of:

(i) A Ticketing Office, (ii) Vehicle Parking, (iii) Passenger Waiting Area, and (iv) RoRo Pier. The access road is already in place as this landing site is already in operation (Figure 39).

Figure 39. Vehicle taken off the Kiyindi-Buvuma ferry (Courtesy of Odong (2017))

The land at the landing site is under control of Uganda National Roads Authority which has operated there for many years. One of the major challenges at the proposed development site is that the water levels fluctuate which has led to the continued need to shift the pier from one place to another (Figure 40) in addition to dredging.

Figure 40. Shifting of docking area due to reported fluctuations in water levels at the proposed development site at Buvuma Landing Site.

Tables 26 and 27 present the environmental and social characteristics of Buvuma Landing Site.

Tables 26. Environmental and social characteristics of Buvuma Landing Site

	Type of land at the proposed development area	Type and amount of vegetation	Type and amount of animals
Pier Area	Open water	None	None
Vehicle parking area	Mud/dirt/earth	None	None
Passenger Waiting Area	Mud/earth/dirt	None	None
Ticketing Area	n/a	n/a	n/a
Access road	There is an established dirt/murram access road that connects the envisioned development site to other parts of the island		

Tables 27. Other environmental and social characteristics of Buvuma Landing Site

	Inhabitants	Structures	Sources of water and air pollution	Items with cultural & heritage value
Pier Area	None	None	Runoff from surrounding areas and open defecation	None
Vehicle parking area	None	None	Runoff from surrounding areas and open defecation	None
Passenger Waiting Area	None	None	Runoff from surrounding areas and open defecation	None
Ticketing Area	None	None	Runoff from surrounding areas and open defecation	None

2.16 *MATOLO, SIGULU ISLAND, NAMAYINGO*

The proposed activities at Matolo, Sigulu Island in Namayingo District under the Lake Victoria Transport Program include development of: (i) A Ticketing Office, (ii) Passenger Waiting Area, and (iii) RoRo Pier. According to the District Fisheries Officer, Namayingo District, Matolo is a very strong revenue base for Namayingo District. Matolo Landing site is for the most part, vacant. Most of the envisioned development site is rocky, with stones very visible everywhere.

Tables 28 and 29 present the environmental and social characteristics of Matolo Landing Site.

Tables 28. Environmental and social characteristics of Matolo Landing Site.

	Type of land at the proposed development area	Type and amount of vegetation	Type and amount of animals
Pier Area	Open water with visible rocks	None	None
Vehicle parking area	Open ground	Very limited vegetation (open ground)	None
Passenger Waiting Area	Open ground	Very limited vegetation (open ground)	None
Ticketing Area	Open ground	Very limited vegetation (open ground)	None

Tables 29. Other environmental and social characteristics of Matolo Landing Site.

	Inhabitants	Structures	Sources of water and air pollution	Items with cultural & heritage value
Pier Area	None	None	None	None
Vehicle parking area	None	None	None	None
Passenger Waiting Area	None	None	None	None
Ticketing Area	None	None	None	None

2.17 SSENYI, BUIKWE

The proposed activities at Ssenyi Landing Site in Buikwe District under the Lake Victoria Transport Program include development of: (i) A Ticketing Office, (ii) Passenger Waiting Area, and (iii) RoRo Pier. According to the District Fisheries Officer, Buikwe District, the land at the proposed site is owned by private individuals.

Tables 30 and 31 present the environmental and social characteristics of Ssenyi, Buikwe District.

Tables 30. Environmental and social characteristics of Ssenyi, Buikwe District.

	Type of land at the proposed development area	Type and amount of vegetation	Type and amount of animals
Pier Area	Open water	None	None
Vehicle parking area	n/a	n/a	n/a
Passenger Waiting Area	Open ground	None	None
Ticketing Area	Open ground	Open ground with some shrubs and isolated trees	None

Tables 31. Other environmental and social characteristics of Ssenyi, Buikwe District.

	Inhabitants	Structures	Sources of water and air pollution	Items with cultural & heritage value
Pier Area	None	None	None	None
Vehicle parking area	None	None	None	None
Passenger Waiting Area	None	None	None	None
Ticketing Area	None	None	None	None

2.18 BUZIRI, BUKWAYA ISLAND, BUVUMA

The proposed activities at Buziri Landing Site on Bukwaya Island, Buvuma District under the Lake Victoria Transport Program include development of: (i) A Ticketing Office, (ii) Passenger Waiting Area, and (iii) RoRo Pier. According to the District Fisheries Officer, Buvuma District, there is need for an access road at the landing site.

Tables 32 and 33 present the environmental and social characteristics of Buziri, Bukwaya Island, Buvuma District.

Tables 32. Environmental and social characteristics of Buziri, Bukwaya Island, Buvuma District.

	Type of land at the proposed development area	Type and amount of vegetation	Type and amount of animals
Pier Area	Very deep water	Open water	None
Vehicle parking area	n/a	n/a	n/a
Passenger Waiting Area	Vacant cropping area (limited activity)	Open area with some trees	None
Ticketing Area***	Vacant cropping area (very limited activity)	Open area with some trees	None

*** - There is a need for an access road, as indicated by the District Fisheries Officer

Tables 33. Other environmental and social characteristics of Buziri, Bukwaya Island, Buvuma District.

	Inhabitants	Structures	Sources of water and air pollution	Items with cultural & heritage value
Pier Area	None	None	Limited runoff from cropping land	None
Vehicle parking area	n/a	n/a	n/a	n/a

Passenger Waiting Area	None	None	Limited runoff from cropping land	None
Ticketing Area	None	None	Limited runoff from cropping land	None

2.19 LWAJI ISLAND, BUVUMA

The proposed activities at Lwaji Island, Buvuma District under the Lake Victoria Transport Program include development of: (i) A Ticketing Office, (ii) Passenger Waiting Area, and (iii) RoRo Pier. Ownership of the land at Lwaji[52] Island is a combination of private land ownership and Mailo land (Buganda Government).

Tables 34 and 35 present the environmental and social characteristics of Lwaji Island, Buvuma District.

Tables 34. Environmental and social characteristics of Lwaji Island, Buvuma District.

	Type of land at the proposed development area	Type and amount of vegetation	Type and amount of animals
Pier Area	Open water	Open water	Open water
Vehicle parking area	n/a	n/a	n/a
Passenger Waiting Area	Open ground with some trees	Open ground with some trees	None
Ticketing Area	Open ground with some trees	Open ground with some trees	None

Tables 35. Other environmental and social characteristics of Lwaji Island, Buvuma District.

	Inhabitants	Structures	Sources of water and air pollution	Items with cultural & heritage value
Pier Area	None	None	None	None
Vehicle parking area	n/a	n/a	n/a	n/a
Passenger Waiting Area	None	None	None	None
Ticketing Area	None	None	None	None

2.20 LUBYA, BUVUMA ISLAND, BUVUMA

The proposed activities at Lubya Landing Site, Buvuma Island, Buvuma District under the Lake Victoria Transport Program include development of: (i) A Ticketing Office, (ii) Passenger Waiting Area, and (iii) RoRo Pier. The local government owns the land surrounding Lubya, the proposed development site. As such, no encumbrances would be encountered for the future development of the site. The island, according to the District Fisheries Officer is densely populated.

Tables 36 and 37 present the environmental and social characteristics of Lubya Landing Site, Buvuma Island, Buvuma District.

Tables 36. Environmental and social characteristics of Lubya Landing Site, Buvuma Island, Buvuma District.

	Type of land at the proposed development area	Type and amount of vegetation	Type and amount of animals
Pier Area	Beach/sandy landscape and Open water	Open water	None
Vehicle parking area	n/a	n/a	n/a

[52] Plenty of bird life exists on Lwaji Island given the many birds flying in and out of their nesting grounds, according to the District Fisheries Officer, Buvuma District.

Passenger Waiting Area	Open ground	Open ground	Open ground
Ticketing Area	?	?	?

Tables 37. Other environmental and social characteristics of Lubya Landing Site, Buvuma Island, Buvuma District.

	Inhabitants	Structures	Sources of water and air pollution	Items with cultural & heritage value
Pier Area	None	None	None	None
Vehicle parking area	n/a	n/a	n/a	n/a
Passenger Waiting Area	None	None	None	None
Ticketing Area	None	None	None	None

2.21 LYABAANA, BUVUMA

The proposed activities at Lyabaana Landing Site, Buvuma Island, Buvuma District under the Lake Victoria Transport Program include development of: (i) A Ticketing Office, (ii) Passenger Waiting Area, and (iii) RoRo Pier. A large part of Lyabaana Island is owned by the late Mayanja family. Mayanja was one of the most prominent fishermen on the island and therefore acquired lots of land on the island. The envisioned development site, directly falls on land owned by the Mayanja family (private land).

Tables 38 and 39 present the environmental and social characteristics of Lyabaana Landing Site, Buvuma Island, Buvuma District.

Tables 38. Environmental and social characteristics of Lyabaana Landing Site, Buvuma Island, Buvuma District.

	Type of land at the proposed development area	Type and amount of vegetation	Type and amount of animals
Pier Area	Open water	None	None
Vehicle parking area	n/a	n/a	n/a
Passenger Waiting Area	None	Open ground and some of it lies on a rock outcrop	None on record
Ticketing Area	None	Open area	None on record

Tables 39. Other environmental and social characteristics of Lyabaana Landing Site, Buvuma Island, Buvuma District.

	Inhabitants	Structures	Sources of water and air pollution	Items with cultural & heritage value
Pier Area	None	None	None	None
Vehicle parking area	n/a	n/a	n/a	n/a
Passenger Waiting Area	None	None	None	None
Ticketing Area	None	None	None	None

2.22 KALYAMBUZI, DAMBA ISLAND, MUKONO

The proposed activities at Kalyambuzi, Damba Island, Mukono District under the Lake Victoria Transport Program include development of: (i) A Ticketing Office, (ii) Passenger Waiting Area, and (iii) RoRo Pier. The envisioned development site in Kalyambuzi is situated very close to the landing site on Ddamba Island. Indeed, the envisioned development site falls within the beach management unit jurisdictions. The pier area occupies part of the landing area and currently occupied by fishing boats. The land on Ddamba Islands is Mailo Land falling under the jurisdictions of Buganda Land Board (Kyaggwe Block 497 Plot 1 (Approx 1 Square Mile)

Tables 40 and 41 present the environmental and social characteristics of Kalyambuzi, Damba Island, Mukono District.

Tables 40. Environmental and social characteristics of Kalyambuzi, Damba Island, Mukono District.

	Type of land at the proposed development area	Type and amount of vegetation	Type and amount of animals
Pier Area	Open area and some parts are occupied by fishing boats	None	None reported
Vehicle parking area	n/a	n/a	n/a
Passenger Waiting Area	Open area with few trees	Open area	None reported
Ticketing Area	Some structures that are part of the fish landing site are being constructed	Open area	None reported

Tables 41. Other environmental and social characteristics of Kalyambuzi, Damba Island, Mukono District.

	Inhabitants	Structures	Sources of water and air pollution	Items with cultural & heritage value
Pier Area	None	None	None	None
Vehicle parking area	n/a	n/a	n/a	n/a
Passenger Waiting Area	None	None	None	None
Ticketing Area	None	None	None	None

2.23 NAMISOKE, BUBEKE ISLAND, KALANGALA

The proposed activities at Namisoke, Bubeke Island, Kalangala District under the Lake Victoria Transport Program include development of: (i) A Ticketing Office, (ii) Passenger Waiting Area, and (iii) RoRo Pier.

Tables 42 and 43 present the environmental and social characteristics of Namisoke, Bubeke Island, Kalangala District.

Tables 42. Environmental and social characteristics of Namisoke, Bubeke Island, Kalangala District.

	Type of land at the proposed development area	Type and amount of vegetation	Type and amount of animals
Pier Area	Open water	Open water	None reported
Vehicle parking area	n/a	n/a	n/a
Passenger Waiting Area	Open area and some of it lying on the fishing beach	Open ground	None reported
Ticketing Area	Part open and part tree covered	Part open and another part covered with trees	None reported
Access road	Absent		

Tables 43. Other environmental and social characteristics of Namisoke, Bubeke Island, Kalangala District.

	Inhabitants	Structures	Sources of water and air pollution	Items with cultural & heritage value
Pier Area	None	None	None	None
Vehicle parking area	n/a	n/a	n/a	n/a

Passenger Waiting Area	None	None	None	None
Ticketing Area	None	None	None	None

ANNEX OF PRELIMIMNARY ESIA – CONTACT LIST

PERSONS CONSULTED

	Name	Responsibility	Telephone No.
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