Ministry of Transport and Public Works

Malawi National Transport Master Plan

Inland Waterways Sub-Sectoral Plan

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Acronyms

CAPEX	Capital Expenditure
CPF	Central Processing Facility
DCA	Department of Civil Aviation
DMS	Department of Marine Services
DRTSS	Directorate of Road Traffic and Safety Services
EEDI	Energy Efficiency Design Index
ESCOM	Electricity Supply Corporation of Malawi
FCS	Fast Crew Supplier
GoM	Government of Malawi
GHG	Greenhouse Gas
ICEIDA	Icelandic International Development Agency
IMDGC	International Maritime Dangerous Goods Code
IMO	International Maritime Organisations
IRR	Internal Rate of Return
IWSA	Inland Waters Shipping Act
IWT	Inland Water Transport
MACRA	Malawi Communications Regulatory Authority
MASL	Metres Above Sea Level
MLS	Malawi Lake Services
MPC	Malawi Ports Company Limited
MR	Malawi Railways
MSC	Malawi Shipping Company
MV	Merchant Vessel
MWK	Malawi Kwacha
NTMP	National Transport Master Plan
OPEX	Operational Expenditure
PPP	Public Private Partnerships
PSO	Public Service Obligation
RA	Roads Authority
RAMRAM	Rial and Marine Regulatory Authority of Malawi
RFA	Roads Fund Administration
SADC	Southern African Development Community
SWOT	Strengths, Weaknesses, Opportunities and Threats
USD	United States Dollar

Road and rail access to Chipoka Port

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Malawi National Transport Master Plan

1 Introduction, aims and objectives

Inland Water Transport Sub-Sectoral Plan

1 Introduction, aims and objectives

1.1 Introduction to the National Transport Master Plan

The Government of Malawi commissioned WS Atkins in February 2016 to prepare a National Transport Master Plan (NTMP). The primary objective of the study is the development of a plan to guide the sustainable development of an integrated multi modal transport sector over the period 2017 to 2037.

The study has identified the requirements of the sector in terms of the transport provision required for freight and passenger services under each mode of transport and potential inter-modal transfer facilities. The NTMP is intended to include a prioritized time bound plan for institutional (organizational, policy and regulatory) reform and capacity building in all sub-sectors. This detailed master plan for the inland water transport sub-sector has been developed working with the concerned agencies and organisations, in both the public and private sector.

1.2 Introduction to inland waterway transport

Various African inland waterways are being used to transport goods and passengers. The Nile, Niger, and Congo Rivers have been navigable for many years. Vessels today carry passengers and freight across Lake Malawi, Lake Victoria and Lake Tanganyika.

Inland waterway systems have been successful in Europe and the USA, where inland waterway freight transportation can move bulk and container shipments at a lower cost per unit distance than either lorry or railway transportation. The African continent including Malawi has been largely dependent on the road transport system with the Inland Water Transport (IWT) remaining undeveloped.

The main inland waterways of Malawi primarily consist of the Lake Malawi and the Shire River. IWT has played a significant role historically, economically and as a means of communication for the country. Since its introduction in Malawi in the early 20th century, IWT has been closely linked to national and regional history and has had an irregular evolution as other modes of transport have developed.

Malawi being a landlocked country, relies heavily on seaports from neighbouring countries to import and export various commodities. Due to its geographical position, Mozambique seaports were the natural means of access until the civil war in Mozambique started in the 1970s. IWT reached its peak in the 1970s and 1980s as Dar es Salaam became the main transport corridor to and from Malawi. Due to low competition when road infrastructure in the north of Malawi was undeveloped, Lake Malawi became an essential transport link to the south of the country. New ports flourished in the North of the lake (Chilumba) and in the South (Chipoka) linking the lake to the railway network and the rest of the country. IWT was also the only mode of transport for passengers of some communities based on the lake shore. With the end of the civil war in Mozambique in the 1990s and the re-opening of the Mozambican transport corridors together with the road network improvement, IWT has declined.

There have been attempts to revive IWT in Malawi with the development of new concessions bringing private investment to the development and operation transport across the lake but this has proved to be unsuccessful to date.

1.3 **Aim and objectives**

1.3.1 Objectives of the NTMP

The primary objective of the overall study is the development of a National Transport Master Plan (NTMP) to guide the sustainable development of an integrated multi modal transport sector for Malawi over the period 2016 to 2037. Three strategic objectives have been developed to support to guide the development of the overall NTMP:

1. Reduce transport costs and prices across all modes;
2. Improve the safety of transport infrastructure and services; and
3. Enhanced and sustainable passenger and freight transport systems.

The achievement of these long-term goals will be guided by the pursuit of the following operational objectives, listed below:

1. To facilitate a modal shift from road to rail and inland water transport;
2. To mainstream safety and security considerations into transport projects, policies and related processes;
3. To increase citizens' access to all-weather roads;
4. To improve intermodal integration;
5. To enhance the connectivity of rural areas, including to support continued growth of the agricultural sector;
6. To foster transport systems to support the development of oil and mining sectors;
7. To improve the resilience of transport infrastructure and services;
8. To develop the domestic freight industry; and
9. To reduce dependence on Mozambique for access to international markets.

1.3.2 Objectives of the Inland Water Transport Sub-Sectoral plan

The objectives for the inland water transport sub-sector are designed to support and achieve the overall NTMP objectives. The sub-sectoral objectives are:

- To reduce transport cost for both passenger and freight movement on inland water transport;
- To improve safety standard of the inland water transport operations;
- To develop inland water transport and integrate it into Malawi's multimodal transport system;

Operational objectives 1, 2, 4, 6, 7 and 9 (above) apply to the inland water sub-sector.

Loading area at Chipoka Port

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Malawi National Transport Master Plan

2 Sub-Sector overview

Inland Water Transport Sub-Sectoral Plan

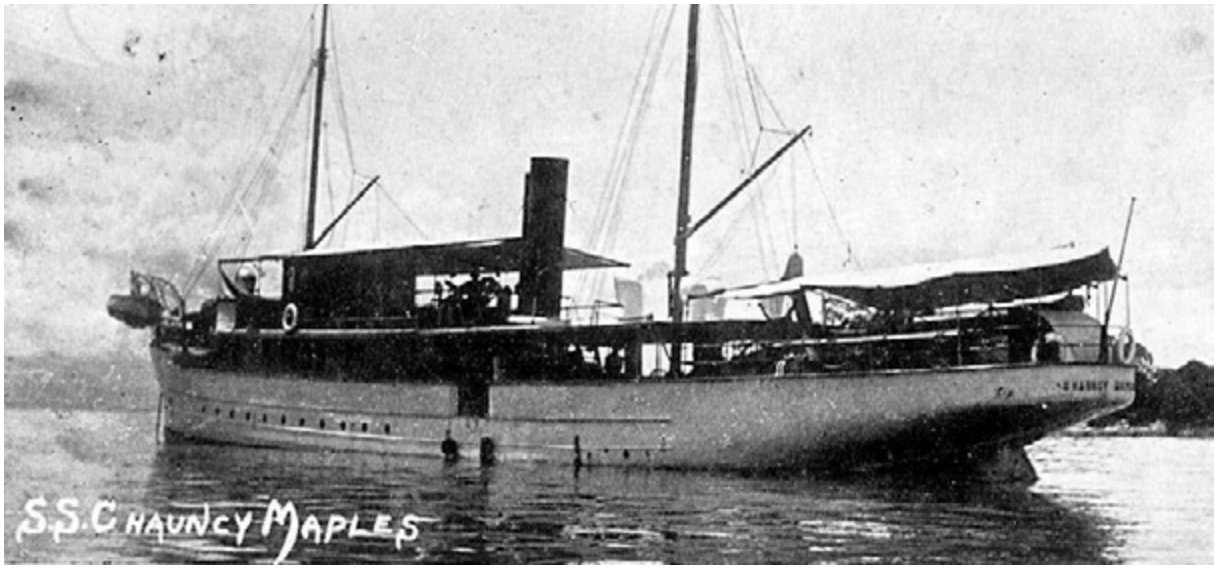
2 **Sub-Sector overview**

2.1 **Background**

Lake Malawi is the third largest lake in Africa. The lake is over 550 kilometres long and about 75 kilometres wide at its widest point. It is bordered by Malawi, Tanzania and Mozambique. There is a tributary river at its southern end, the Shire River, which flows into the Zambezi River in Mozambique.

Transport on the lake was introduced in the early 20th century with MV Chauncy Maples (see Figure 2.1) operating in 1901 as the SS Chauncy Maples. MV Mpasa entered service in 1935 and the ferry MV Ilala entered service in 1951 and is still operating.

Figure 2.1 SS Chauncy Maples in early 1900s



Source: Chauncy Maples Malawi Trust

Lake Malawi and the Shire River play a significant role historically, economically and as a means of communication for the country. Lake Malawi has played a major role in the life of the communities of Malawi as it runs the length of the country. The local communities are dependent on fishing for a livelihood as the soil is poor and crop failure frequency is high. As a result, numerous villages populate the shore of Lake Malawi and while the southern shore of the Lake has traditionally been well connected to roads, the villages on the northern shore have been isolated from the transport network with the lake providing the most convenient access for passenger and freight transport. Lake transport is the only mode of transport available to certain lakeshore communities.

The use of river transport was relatively frequent for much of the 20th century. Barge traffic was operational on the lower Shire and Zambezi rivers linking Chinde in Mozambique with Nsanje in Malawi until it was ended by the Mozambican civil war in 1976. Following the outbreak of war in Mozambique, Malawi turned towards Tanzania for the import and export of commodities to seaports and Dar es Salaam was seen as the natural seaport in and out of Malawi. Although the corridor is not directly linked to the lake, development of container and petroleum transhipment ports took place at Chilumba and Chipoka making waterway transport an essential transport mode. It was envisaged that shipping on the river system could “kick start” trade in the entire region, but inland waterway traffic never reached the anticipated level due to the development of, and competition presented by, the road network and it is now limited to some minimal freight and passenger transport on Lake Malawi.

2.2 Overview of the concession agreements

The Government of Malawi is currently the sole shareholder in MLS (Malawi Lake Services Limited), a private company limited by shares under the Companies Act. This corporate entity also owns the MLS Estate (land, buildings and assets). It operated the Lake Services (the Commercial Lake Services customarily provided by MLS and the passenger Lake Services provided as a PSO or as a commercial passenger service).

In 1999, Glens Waterways signed a 35 year concession to operate the freight and passenger services provided by MLS. This concession was terminated in 2010.

The Government of Malawi then granted a 35 year concession to the Malawi Shipping Company (MSC) in 2010 and Malawi Ports Company (MPC) in 2013 for the management of shipping and port operations respectively. Both companies are subsidiaries of Mota-Engil Africa, an international infrastructure company founded in Portugal. The aim of the concession is to improve the efficiency in service delivery in shipping and port operations.

As part of the concession agreement (41.1.3.), the Malawi Shipping Company is to invest 1% of all gross revenue towards new equipment, rehabilitation and operation of the marine college.

The concession scope for the MSC is to transport freight for customers and provide passenger services on the inland waters of Malawi. MSC have the freedom to plan and provide freight services on a commercial basis and set tariff procedures and conditions of transport.

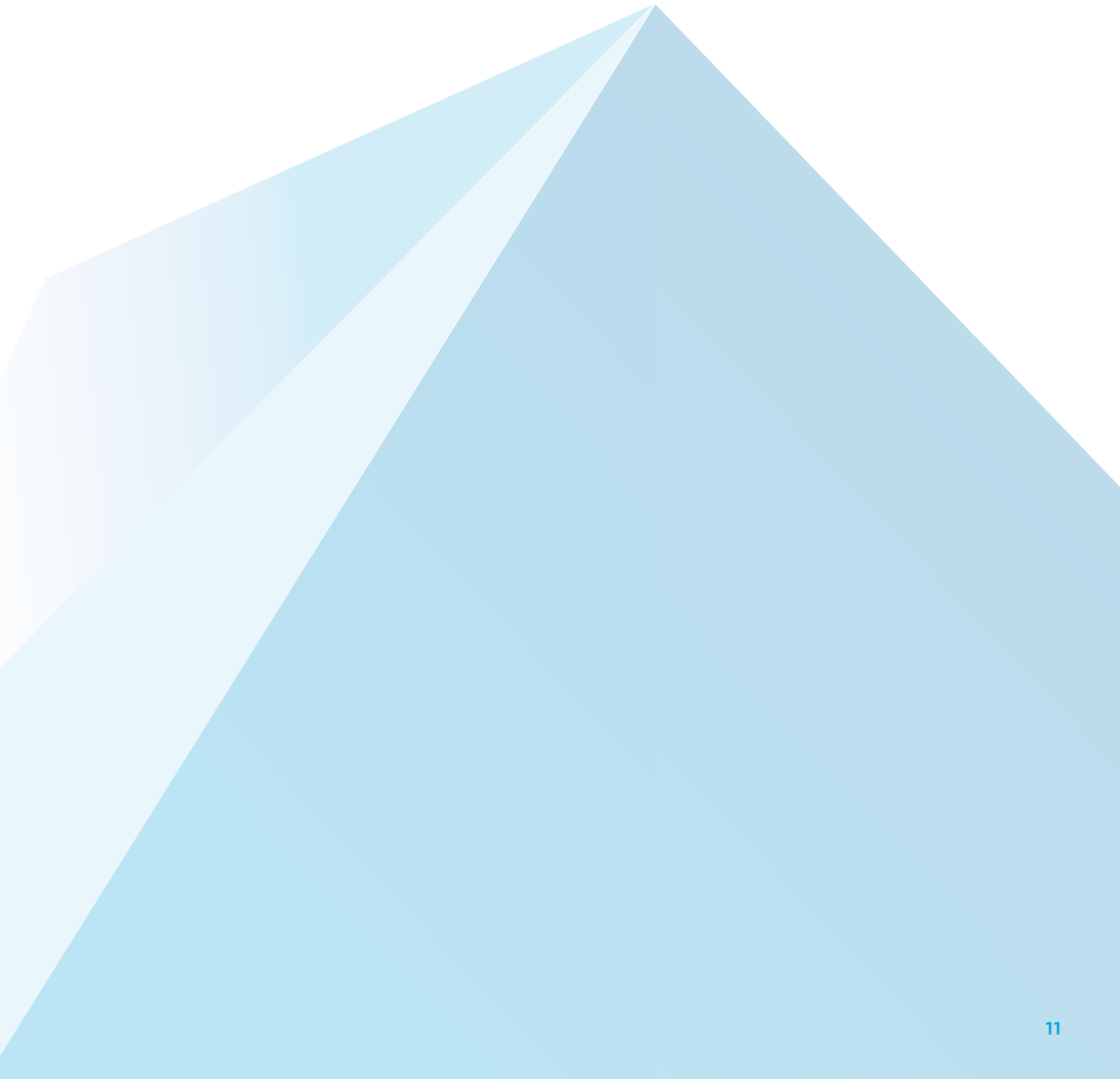
Under the concession MSC is responsible for

- Technical and commercial operation of freight and Public Service Obligation (PSO);
- Operation, rehabilitation and maintenance of the MLS Estate;
- Operation, rehabilitation and maintenance of the moveable Assets;
- Contractual arrangements with customers; and
- Collection of revenues attributable to the transport of freight and PSO.

The concession imposes a minimum passenger Public Service Obligations (PSO) for the operation of the following routes:

1. **Nkhata Bay-Chizumulu-Likoma**
   - A round trip once a week; and
   - Use of a vessel with a carrying capacity of at least 250 passengers (the Concessionaire may offer to use a smaller vessel as long as the number of passengers carried amounts to 250 passengers per week).
2. **Nkhata Bay-Usisya-Chilumba**
   - To serve small towns, namely, Mangwina, Ruarwe, Tchalo and Mlowe;
   - A round trip once a week; and
   - Use of a vessel with a carrying capacity of at least 250 passengers (the Concessionaire may offer to use a smaller vessel as long as the number of passengers carried amounts to 250 passengers per week).

The concession scope for MPC is to operate and maintain the 4 major ports as designated under the Inland Waters Shipping Act. The 4 major ports are Chilumba, Nkhata Bay, Chipoka and Monkey Bay.



Bridge over the Shire river at Mangochi

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Malawi National Transport Master Plan

3 Existing facilities - infrastructure and services

Inland Water Transport Sub-Sectoral Plan

3 Existing facilities – infrastructure and services

3.1 Navigation

3.1.1 Lake Malawi navigation

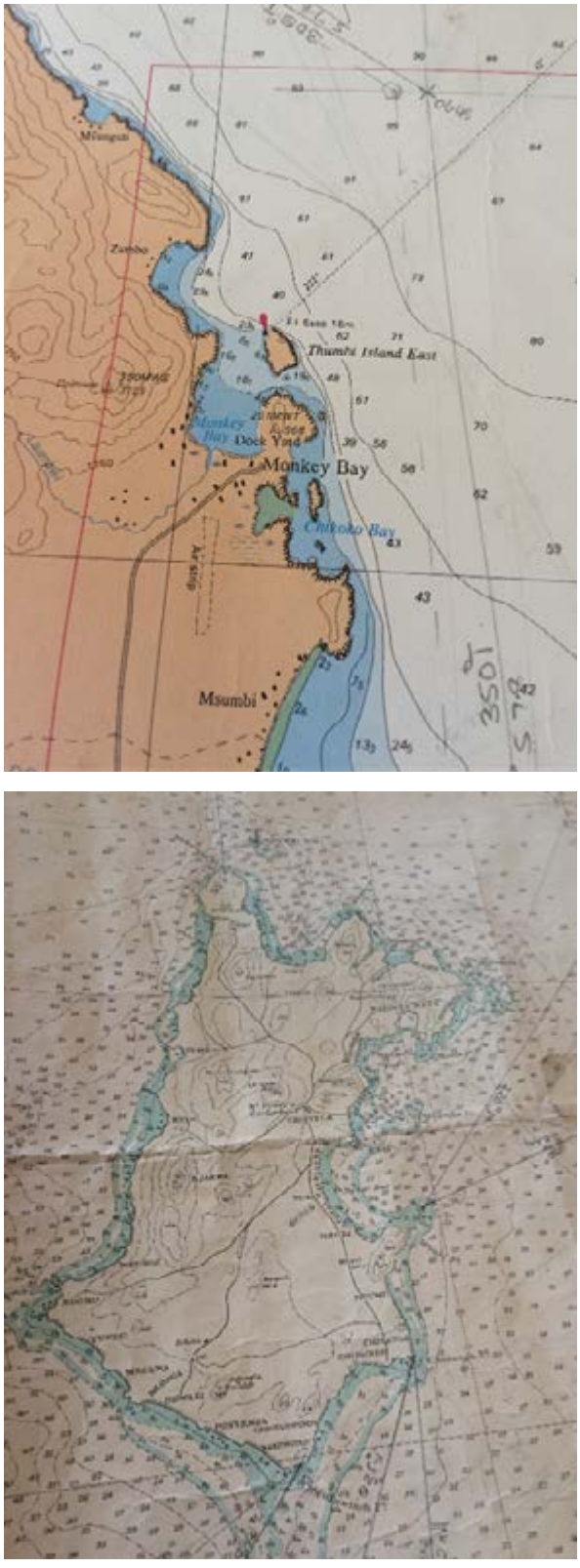
Lake Malawi is the second deepest lake in Africa and is navigable on its entire length. Navigation charts were produced for the lake in the 1960s based on data collected from surveys of 1900s and 1950s. The existing charts lack accuracy and an updated survey of the lake was undertaken with support from the Icelandic International Development Agency (ICEIDA) in the early 2000s.

The main objective of the latest hydrographic campaign was to provide lake users and fishermen on Lake Malawi with an essential tool for safe navigation. The main outputs were:

- Production of new nautical charts for Lake Malawi;
- Modern equipment made available in Malawi to do hydrographic and cartographic work; and
- Trained personnel in Malawi to operate the equipment provided and in the whole sequence of surveying for and designing nautical charts.

The surface of the lake was not fully surveyed and only a few charts have been updated (see Figure 3.1 for examples of available nautical charts, photographed at the Training College).

Figure 3.1 Navigation Charts 2003 chart (Monkey Bay – top) and 1957 chart (Likoma Island – bottom)



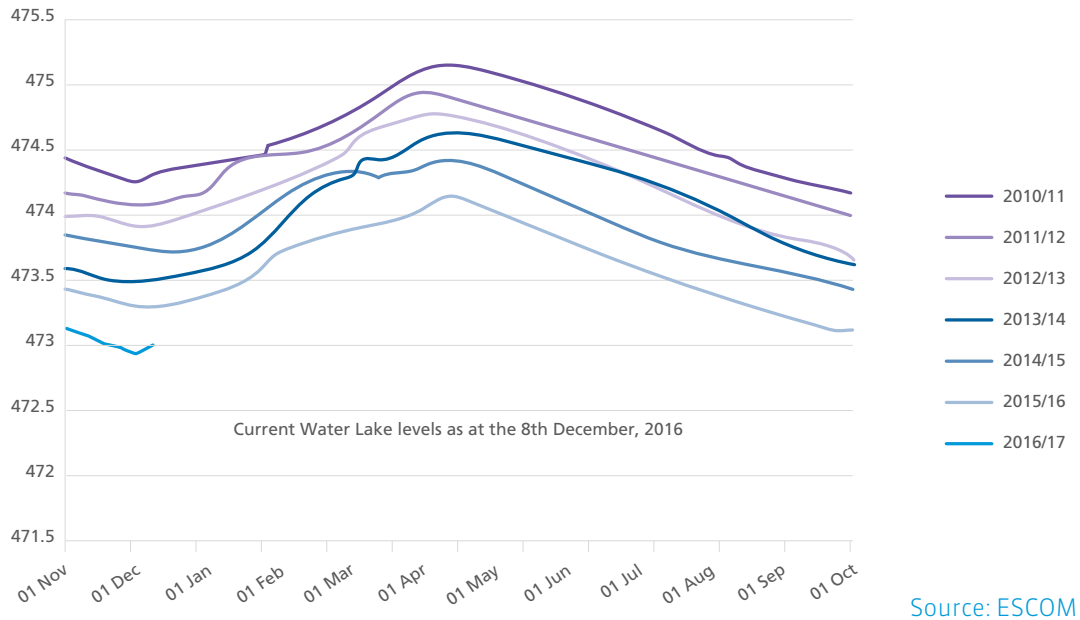
3.1.2 **Water levels**

Lake Malawi water levels have dropped as a result of low rainfall in the past rainy seasons. 60 percent of the water in Lake Malawi comes from rainfall while 40 percent comes from run-off from rivers. The highest water level Lake Malawi ever recorded is 477 metres above sea level (masl) in 1980 and the lowest is 469 masl in 1931 but the levels have been dwindling and the lake has failed to pick up so much so that by the 2016 hydrological year it was at 473 masl, the lowest in a decade (Figure 3.2). The Lake has lost about 4 metres since the 1980's when most of the ports were built and the maximum variation has been 8 metres. It is recommended a hydrological study to be conducted to allow the trend to be assessed.

The recent drop in water level on Lake Malawi has had a major impact on maritime infrastructure. It has restricted access to some of the existing port facilities such as Chipoka (Figure 3.3). The lake water levels have dropped by more than 1m and vessels with large draft cannot currently berth at the port. The facilities were not designed for such an extreme event and it is not possible to dredge the berth further without undermining the existing wall. Furthermore, Chipoka suffers from siltation and siltation-prevention works are required.

The launch ramp at the boatyard at Monkey Bay has also been affected by low water levels.

Figure 3.2 Lake Malawi water levels



Source: ESCOM

Figure 3.3 Low water level at Chipoka port

3.1.3 Shire River Navigation

The Shire River is the largest river in Malawi with a length of 400km. It starts at Lake Malawi and flows into the Zambezi River in Mozambique. Currently, the Malawi Shipping Company does not operate on the Shire River and there is no official movement of passengers or freight except for local fishermen and some localised river crossings. The Shire River is divided in three sections: the Upper Shire River, the Middle Shire River and the Lower Shire River.

3.1.3.1 The Upper Shire River

This section of the river is almost flat and considered navigable from Mangochi to Liwonde. A meeting with the Marine Services confirmed that the Upper Shire River is navigable and that vessels have reached Liwonde in the past. The river is about 200m wide at Mangochi where there is a bridge crossing (see Figure 3.4). This could restrict aerial draught for navigation but this does not appear to be an issue considering the type and size of vessels that are in operation on the inland waterways of Malawi. The river is about 170m wide at Liwonde and the Liwonde dam currently prohibits navigation downstream. There are no hydrographic charts for the river to confirm draft restrictions and it is not known if dredging would be required to open an operational navigation channel.

Figure 3.4 Bridge crossing Shire River at Mangochi

3.1.3.2 The Middle Shire River

It was confirmed by the Marine Services that this section of the river is steep with various rock bars and is not navigable. A series of locks and canals would be required to link the Middle Shire River to the Upper Shire River and Lake Malawi.

3.1.3.3 The Lower Shire River

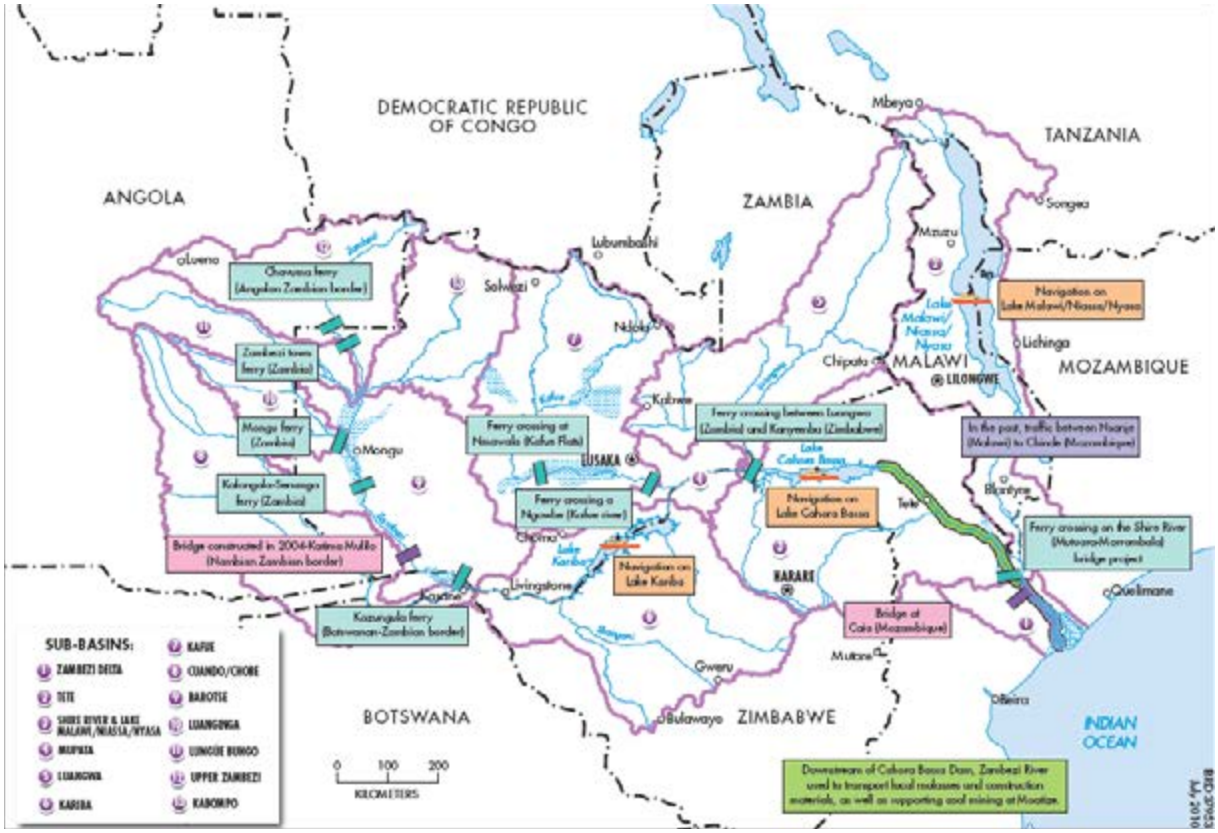
Some portions of the Lower Shire River used to be navigable from Nsanje all the way to the Zambezi River. It is not currently used for navigation due to the large amount of sedimentation and river weed. NEPAD's development of the Shire-Zambezi Waterways[1] Project is among the main navigational initiatives in the region. The project would entail reopening of the Shire and Zambezi rivers to navigation to provide a direct waterway transport system between Nsanje in Malawi and the port of Chinde on the Indian Ocean, approximately 340 km away. A river port was built in Nsanje in 2009/2010, but the project has stalled (see section 10.1.5).

1 *The Zambezi River Basin - A Multi-Sector Investment Opportunities Analysis - The International Bank for Reconstruction and Development/The World Bank (2010)*

3.1.4 Navigation summary

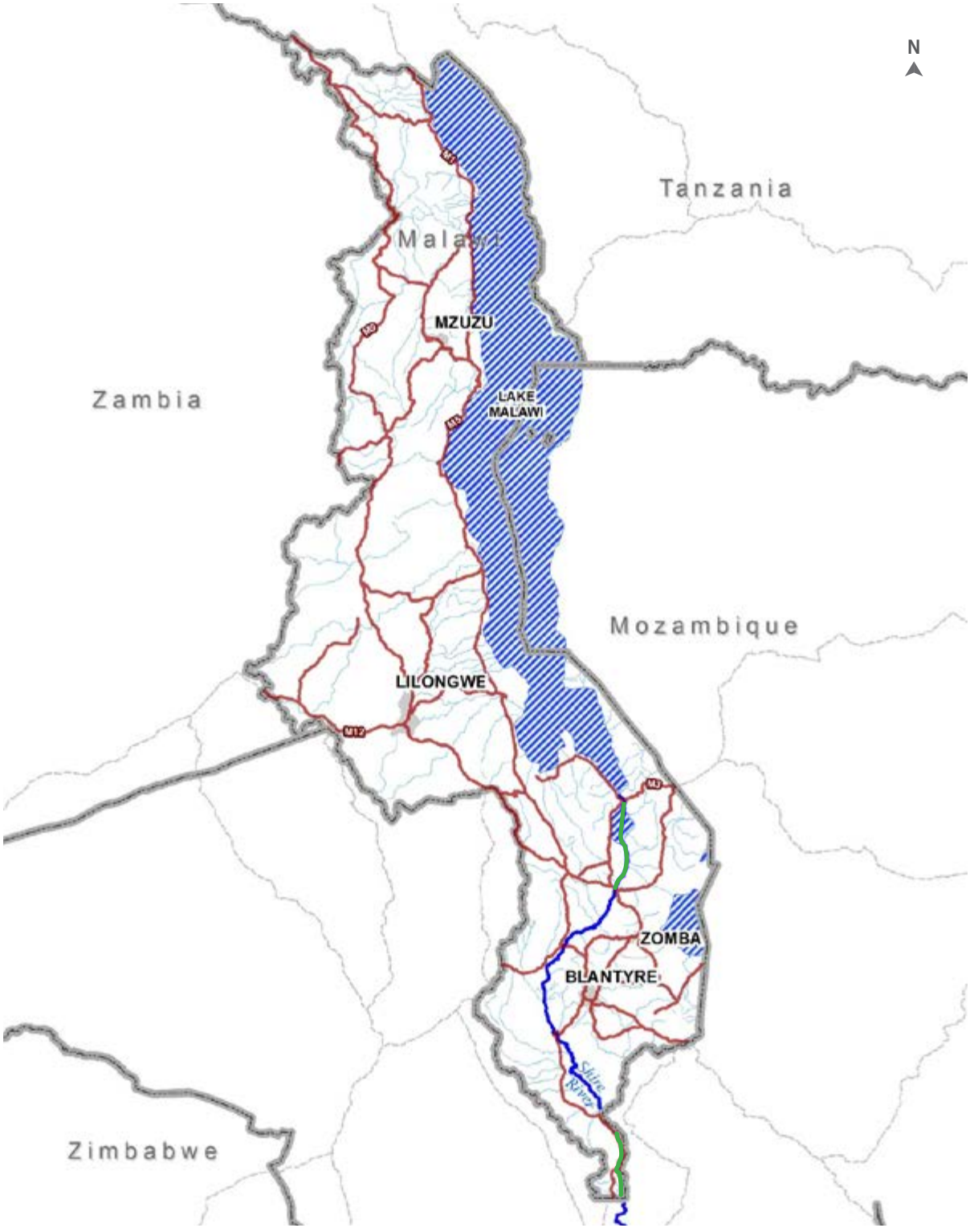
Currently, Lake Malawi and the Upper Shire River are connected and form the bulk of the inland waterway system of Malawi. Lake Malawi is used for passenger and freight movements and has navigable waters although low water levels have restricted access to some of the ports in recent years. The Upper Shire River has the potential to be navigable and connected to the IWT system. The Lower Shire River also has the potential for navigation but is not currently linked to any other inland waterways in Malawi (Upper Shire River and Lake Malawi) nor Mozambique (Zambezi River). Figure 3.5 provides an overview of navigation in the Zambezi river basin, and Figure 3.6 of navigable waterways in Malawi.

Figure 3.5 Navigation in the Zambezi River Basin[2]



2 Source: Conservation International 2008

Figure 3.6 Malawi IWT navigation



Legend

- Main roads
- External road network
- Shire River
- Major lakes
- Navigable section of Shire River

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3.2 **Ports**

Currently, much of the infrastructure of the Lake Malawi ports is in a dilapidated state. Two ports (Chipoka and Chilumba) have been designed to handle containers, general cargo and liquid bulk. The other ports do not have major handling equipment facilities. There are 4 main ports on the Malawian shores of Lake Malawi, which are described in more detail in Table 3.1.

Table 3.1 Summary of port facilities on Lake Malawi

Port	Machinery	Storage area	Condition
Monkey Bay	1 x mobile crane 1 x tractor 1 x trailer	Dry – 500m²	Old and dilapidated Rehabilitation in 2013
Chipoka	1 x 35 mt gantry crane 4 x 3 mt forklifts	Dry – 800m² Liquid –- 923,000 litres	Old and dilapidated Rehabilitation in 2013
Nkhata Bay	Machine tools Cranes	Warehouses	Jetty currently not operational
Chilumba	1 x 35 mt gantry crane 1 x 20 mt mobile crane 1 x 6 mt forklift 5 x 3 mt forklifts 1 x tractor 1 x trailer	Dry – 800m² Liquid – 583,000 Litres	Gantry crane lost Old and dilapidated

Ports are managed under a concession to the Malawi Ports Company (MPC). MPC appear not to have invested in the ports, and in some cases operating conditions have worsened since the agreement was signed. The four ports are introduced in turn below:

3.2.1 **Monkey Bay**

Monkey Bay is located on the southern shore of the lake and is currently the principal commercial cargo and passenger traffic centre on Lake Malawi. It is the base for all main vessels. It was historically set up as the main base as the bay is very sheltered and it has good natural water depth (>10m).

Monkey Bay port has one floating structure with a linkspan bridge (see Figure 3.7), which provides berthing facilities for all commercial and passenger vessels. Berthing space is limited and the vessels need to double berth or be moored in the bay.

Figure 3.7 Monkey Bay berthing facilities and floating dry dock

The port acts as the starting point for the MV Ilala ferry for passenger transport across the lake. The vessel takes just under a week to conduct the round trip.

Although the port has not been designed to handle freight effectively and only has limited mobile equipment, cargo currently transit via Monkey Bay as it is the main operational port infrastructure across the lake. It is not considered to be the preferable geographical location for a central operation as Monkey Bay is not on the main transport corridors and is not linked to the railway network.

Monkey Bay port is also the main base for maintenance and construction of vessels. The shipyard (Figure 3.8) has 5 rails for launching new built vessels and various workshops. There is also a floating dry dock for maintenance of large vessels. It is the only one on the lake.

Figure 3.8 Monkey Bay shipyard

3.2.2 Chipoka

Chipoka port is located in the south of the lake, next to Salima, and is the closest port to Lilongwe, the capital city. In the 1980s, the port was integrated with the Dar es Salaam corridor and developed as a main freight terminal to transfer containers, fuel and general cargo. A regular shipping line was established between Chipoka and Chilumba in the north.

The berth consists of a solid sheet piled quay wall and has approximately 150m long berthing facilities. The equipment consists of a gantry crane designed to handle containers (Figure 3. 9). The port is directly linked to the railway network with a railway line that enters the port and connects directly to the quay side. As there is no container traffic on the lake since most container traffic uses the port of Beira by road, the equipment does not appear to be required. The port can also handle liquid bulk (fuel), which was historically being imported from Dar es Salaam. There is currently no fuel transported on the lake. The port also possesses large open storage facilities and warehouses.

As indicated in the navigation section above, the current low water level of the lake has had a major impact on Chipoka port as vessels cannot currently access the berth. It is not possible to dredge further as this would undermine the wall.

Figure 3.9 Chipoka port

3.2.3 Nkhata Bay

Nkhata Bay port is located in the middle region of the lake and is the main departing point to Likoma and Chizumulu Islands and Mbamba Bay in Tanzania. It mainly acts as a passenger port, although it does have some warehouses. Nkhata Bay port does not currently have any berthing facilities since the jetty structure collapsed in 2013. The large vessels now have to moor in the middle of the bay and are accessed by smaller boats, which could constitute a safety hazard. Nkhata Bay port is not being used to handle cargo at present.

3.2.4 Chilumba

Chilumba port is located in the north of the lake. As for Chipoka port, Chilumba port was developed to integrate with the Dar es Salaam corridor and can handle containers, fuel and general cargo. The port has an 80m long solid berth structure with a gantry crane and a 60m long pier (Figure 3.9). The crane is not currently operational. The port also possesses storage facilities. It has no connection to the railway network.

Figure 3.10 Chilumba port

Source: Google Earth

3.2.5 Other port facilities

The remaining lakeshore communities do not have dedicated berthing facilities. Visiting vessels are required to anchor off-shore and a rowing boat or outrigger shuttles passengers to shore. Nkhotakota used to have a jetty to load sugar, but the infrastructure is now dilapidated and out of service.

A major inland port at Nsanje on the lower Shire was constructed in 2010. It is currently not connected to the inland waterway transport network (see para. 3.1.2.3).

3.3 Services and vessels

Malawi Lake Services (MLS) currently has two operational ferries - MV Ilala, which has been in operation since 1951, and MV Chilembwe, a newly built vessel which started service in 2015. The Fast Crew Supplier (FCS) 3307 Chilembwe was built in Monkey Bay with the purpose of replacing MV Ilala in the long term. However, MV Ilala is still the main ferry offering passenger service across the lake and Chilembwe is only used as replacement as it has a high fuel consumption. The MV Ilala's return route (from the December 2016 timetable) takes five and half days, sailing from Monkey Bay to Chilumba via Makanjila, Senga Bay, Nkhotakota, Likoma/Chizumulu, Nkhata Bay and the northern villages, leaving on Fridays and returning on Wednesdays (Figure 3.11).

The MV Chambo sails from Metengula on Wednesdays to Likoma/Chizumulu and Nkhata Bay, returning on Thursdays. On Saturdays it plys to Likoma and Chiwindi, returning on Sundays. On Mondays it sails from Metengula to Makanjila, calling at the Mozambiquan coastal ports, then onto Senga Bay and Chipoka returning on Tuesdays (Figure 3.12).

Figure 3.11 Lake Malawi Ilala ferry route

Legend

- Lake Malawi ports
- MV Ilala route
- International railways
- Main roads
- External roads network
- Cities
- Major rivers
- Major lakes

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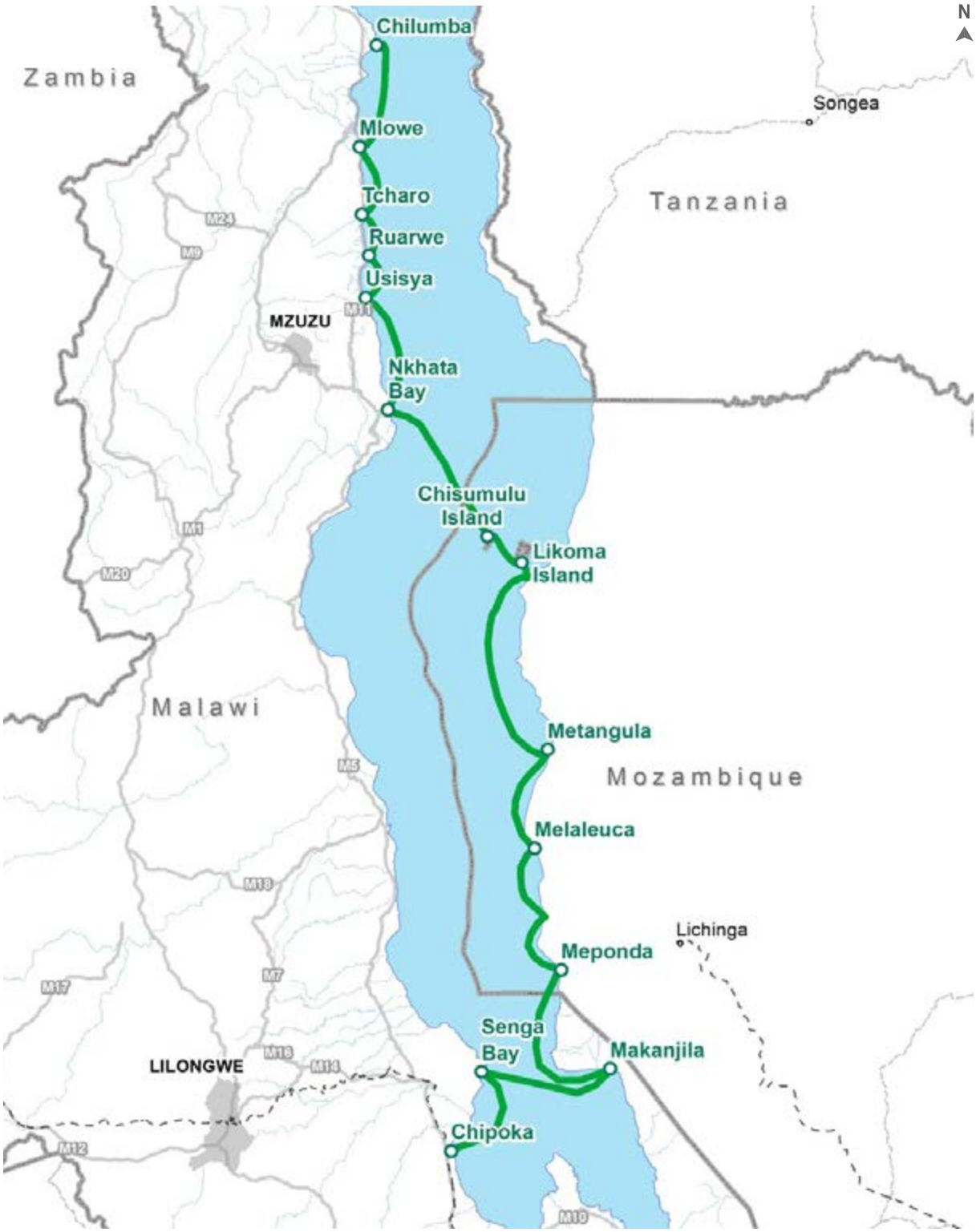
Project:

National Transport Master Plan

Figure 3.12 Lake Malawi Chambo ferry route



Legend

- Lake Malawi oorts
- Chilumba route
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There is no dedicated and regular shipping line for freight. Freight is currently being transported on a case-by-case basis with the main line being between Chilumba and Monkey Bay as these are the main ports with operational capacities. The current lake transport solution being implemented is Lift on -Lift off (LoLo) for barges or vessels using shore side or vessel mounted cranes as lifting equipment.

MSC has the following vessels dedicated to freight transport in operation, whilst the rest of the fleet is either not operational or has been scrapped:

- General cargo vessels MV Karonga, Viphya and 3 other barges;
- Container vessel MV Katundu; and
- Fuel cargo MV Ufulu (not in operation for 15 years).

The vessels operated by MSC are summarised in Table 3.2 and examples of two of the vessels shown in Figure 3.13.

Table 3.2 Summary of fleet of vessels operated by MSC

Name	Length (m)	Weight (mt)	Cargo	Passengers	Comments
MV Ilala	52.4	630	216 m^3	460	Passenger vessel
MV Chilembwe	33	-	20 mt	120	Passenger vessel
MV Mtendere	50.7	924	90 m^3	420	Passenger vessel. Awaiting a new engine
MV Chauncy Maples	38.4	250	75 m^3	182	Passenger Vessel. Non operational
MV Karonga	43.1	545	300 mt	-	Cargo only (mostly fuel drums)
MV Ufulu	45.8	424	310 mt	-	Tanker. Has not been in operation for 15 years.
MV Katundu	61.5	750	48 TEU's	-	Container vessel
Viphya tug and pontoon	16.0	6.0	600 mt	-	Pontoon
Seacara	12.3	5.4	-	-	Dredger
Floating Dock	44.5	15.6		-	Floating Dock

Figure 3.13 MV Chilembwe (passengers) and MV Katundu (Container vessel)

In addition to the vessels run by MSC, there are currently over 5,000 motorized vessels of 50t and below being operated in Malawi, including boats owned by the navy, marine police, tourist industry, fishing vessels and Oil and Gas exploration.

Vessels other than those operated by MSC ply on Lake Malawi. Many of these are unregistered craft, of Malawian, Mozambiquan and Tanzanian origin. In particular, passenger vessels operate between Likoma and the mainland (mainly Nkhata Bay) without a timetable at fares below the MSC rates. However, these vessels do not meet regulated safety standards. Small freight vessels also operate from the between the north of Lake Malawi in Tanzania and Malawian ports.

MV Mtendere at Monkey Bay

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Malawi National Transport Master Plan

4 Present demand of IWT

Inland Water Transport Sub-Sectoral Plan

4 Present demand for IWT

4.1 Historic passenger and cargo traffic

Passenger and freight traffic using lake services hit a peak in the mid-1980s with 207,400 passengers being transported in 1987 and 41,600t of cargo in 1986 (see Table 4.1).

The civil war in Mozambique made the northern route through Dar es Salaam corridor an attractive alternative to the Mozambican ports. With the low level of road network development, the lake services were a key transport mode to transport passengers and goods until the 1990s and the end of the civil war.

Table 4.1 Cargo and passenger traffic (1980-1997)[3]

Malawi Lake service cargo and passenger traffic 1980-1997							
	MLS cargo traffic				MLS M passenger traffic		
	Tonne carried (thousands)	Tonne kilometres (millions)	Tonne kilometres index	Kilometres per tonne	Passengers carried (thousands)	Passenger kilometres (millions)	Passenger kilometres index
1980	31.2	10.691	100	342.7	105.1	16.2	100
1981	28.4	9.695	91	341.4	132.7	18.3	113
1982	37.3	12.903	121	345.9	169.7	21.7	134
1983	26.7	8.778	82	328.8	196.6	24.4	151
1984	36.2	12.887	121	356.0	188.4	21.5	133
1985	37.0	12.483	117	337.4	200.6	23.2	144
1986	41.6	13.767	129	330.9	199.7	22.0	136
1987	29.3	9.79	92	334.1	207.4	22.1	137
1988	24.6	8.28	77	336.6	184.7	19.8	123
1989	23.3	8.021	75	344.2	168.0	17.6	109
1990	22.9	8.201	77	358.1	176.5	17.6	109
1991	18.8	6.432	60	342.1	163.9	17.7	110
1992	17.1	5.933	55	347.0	197.1	20.4	126
1993	11.8	3.682	34	312.0	118.3	10.3	64
1994	4.6	0.683	6	148.5	162.3	13.2	82
1995	6.8	4.495	42	661.0	201.1	15.3	95
1996	13.6	1.426	13	104.9	141.3	10.5	65

3 Extract from 'Institutional Support to the Malawi Ministry of Transport, USAID'

4.2 **Recent demand**

4.2.1 **Recent passenger demand**

Based on the data provided by MSC, the current demand for passenger transport has been stable during the period 2012 to 2016 with an average of 25,000 passengers per year. It is to be noted that the MV Ilala was out of service between July 2012 and May 2013. This figures shows a large decline in passenger traffic as compared to the 1980 and 1990s, which peaked at 200,000 passengers carried per year. This is partly explained by the increased competition from road. The road network in northern Malawi was not well developed and lake services used to be the only mode of transport. There is now a road that runs along the lake and is parallel to the lake service and offers a much more competitive and frequent service. This has had an impact on IWT and the yearly figures are now on average 4 to 8 times lower than in the 1980s and 1990s. It also shows that the concession agreement has not managed to compete against road transport and revive passenger transport using an affordable lake service.

Table 4.2 shows recent passenger demand for MSC ferry services, summarised in Figure 4.1. Around half of existing passengers are travelling to/from Likoma, the majority of which are from/to Nkhata Bay.

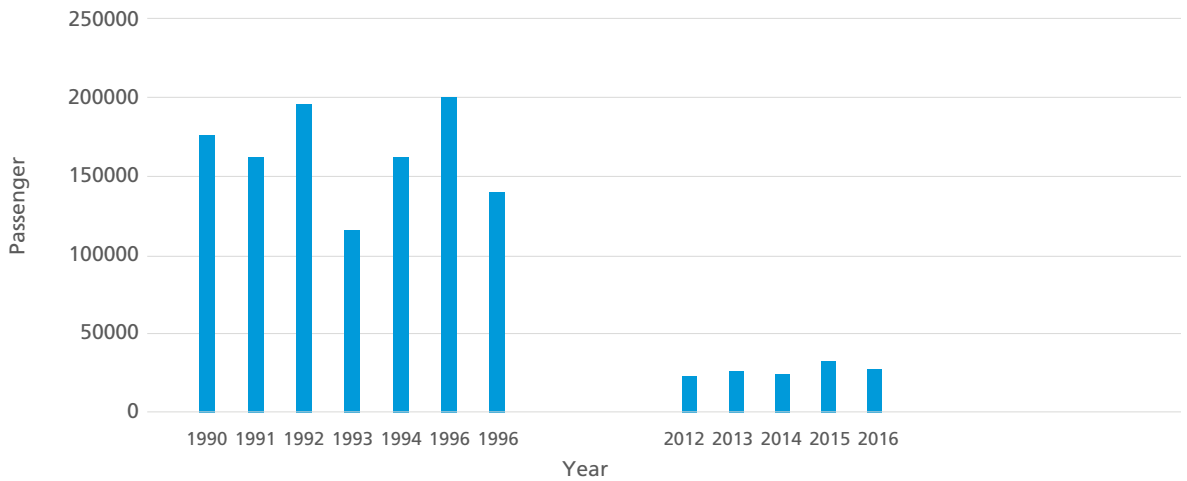
As indicated in the previous section 3.3, MSC offers a service that runs weekly between Monkey Bay and Chilumba and back. It is a requirement as part of the concession agreement that a minimum service is provided weekly to several villages specified in section 4. Traffic surveys were carried out in 2016 in order to get a better understanding of the number

Table 4.2 MSC passenger data (2012-2016)

	2012	2013	2014	2015	2016
January	3,110	0	1,004	2,692	2,409
February	3,551	0	1,475	964	2,022
March	3,379	0	1,243	1,073	2,372
April	3,444	0	3,230	2,514	2,481
May	4,175	0	2,023	2,149	2,610
June	4,364	3,125	2,560	3,025	1,406
July	0	5,095	608	2,178	1,611
August	0	4,294	1,378	4,322	1,409
September	0	5,205	3,307	3,375	3,885
October	0	3,267	3,681	2,549	3,941
November	0	3,039	1,586	3,186	2,056
December	0	555	1,044	2,680	0
TOTAL	**22,023**	**24,580**	**23,139**	**30,707**	**26,202**

Note: MV Ilala was out of service in 2014, which caused a a sudden drop of passenger demand in July 2014

Figure 4.1 Summary of MSC passenger data (1990 - 2016)



of passengers on the various ferry legs across the lake. The results show that most of the journeys are conducted between the central region ports – Likoma islands, Nkhata Bay and the surrounding villages and Nkhotakota, with some journeys undertaken in the southern region of the lake – Makanjila, Monkey Bay and Salima. There are very few journeys that take place all the way to Chilumba or between the North and South regions.

4.2.2 Passenger profile

Recent surveys (2016) undertaken for the National Transport Master Plan (NTMP) have included some 117 interviews of existing ferry passengers. These interviews, conducted predominantly to determine passenger origin-destinations and values of time, also included profile questions which allow a picture to be built up of IWT passengers. The results of the trip purpose question are shown in Table 4.3.

Table 4.3 Ferry passenger trip purpose

Trip Purpose	Number	Percentage (%)
Work	16	1.8
Education	31	3.6
Business	329	38.0
Leisure	11	1.3
Tourism	26	3.0
Shopping	8	1.0
Personal Business	41	4.7
Visiting Friends	404	46.7
Total	**866**	**100.0**

The survey results show that the most popular trip purpose is visiting friends, with those trips comprising 46.7% of the total. Many ferry passengers also travel for business, with these trips representing some 38.0% of responses. There was not a high frequency of responses for any other trip purpose.

The main mode of access to ferry services is shown in Table 4.4. The data shows that under half of the passengers (47%) walk to access the ferry, with a further 9% cycling, giving a total of 55% using non-motorised modes to access the ferry. This suggests that around half of passengers that use the ferry originate in the area reasonably local to the port, rather than the ferry drawing people in from a wider area. This is to be expected given the slow journey times of the ferry, which make it quicker and easier for people from a wider area to use another mode to access their destination directly.

Table 4.4 Ferry passengers' access mode

Mode of Access	%	Number
Walk	47	55
Cycle	9	11
Minibus	1	1
Taxi	16	19
Car	8	9
Train	0	0
Other	19	22
Total	**100**	**117**

Access time to public transport was also examined as part of the survey. The results of this question are given in Table 4.5, which suggest that the majority of ferry passengers (58%) access the ferry in less than one hour. Given that the nearly half of passengers are also known to walk this suggests that the majority of passengers are likely to live within 5 kilometres of the port that they access (assuming a 5 kmph walk speed). Interestingly, 42% of passengers take over an hour to access the ferry, which seems high, but the figures take no account of egress times; it may be that a large access time is worth it if there is a short egress at the destination.

Table 4.5 Ferry passengers' access time

Access time	Percentage of passengers (%)
Less than 10 minutes	3
10 – 19 minutes	15
20 – 29 minutes	5
30 – 44 minutes	31
45 – 59 minutes	5
1 – 2 hours	21
2+ hours	21

The distribution of wait times for ferry services were also determined from the survey, and are shown in Table 4.6.

Table 4.6 Ferry passengers' wait times

Wait time	Percentage of passengers (%)
Less than 10 minutes	2
10 – 19 minutes	9
20 – 29 minutes	5
30 – 44 minutes	14
45 – 59 minutes	5
1 – 2 hours	30
2+ hours	35

The average wait times for ferry services is 2 hours 34 minutes, with more than 65% of passengers having to wait over 1 hour. This is quite a long time to wait for a ferry, but is not surprising given the lack of a fixed definitive timetable for the service.

The response to the question on group size (Table 4.7) shows that most of the ferry passengers surveyed travel alone. Interestingly, when this is examined against the surveys for the other public transport modes, the results are very similar.

Table 4.7 Ferry passenger group size

Group size	Percentage of passengers (%)
Alone	91
1 other adult	4
2 or more other adults	3
1 child aged 5 or under	1
2+ children aged 5 or under	0
1 child aged 6 – 17	3
2+ children aged 6 - 17	0

The frequency of respondent trips by ferry is shown in Table 4.8. They suggest that the passenger ferry services cater for infrequent users, with 50% of the interviewees travelling by ferry less than once per month or for the first time. Only 20% of the users travel on the ferry every week.

Table 4.8 Ferry passenger trip frequency

Frequency of trip	Percentage of passengers (%)
5 or more times per week	1
3 - 4 times per week	1
1 – 2 times per week	20
1 – 3 times per month	29
Less than once per month	25
First time	25
2+ hours	35

The distribution of Ferry passengers by journey time is shown in Table 4.9

Table 4.9 Ferry passenger journey times

Journey time	Percentage of passengers (%)
Up to 1 hour	1
1 to 2 hours	3
2 to 3 hours	23
3 to 4 hours	9
4 to 5 hours	35
5 to 6 hours	9
6 to 7 hours	8
7 to 8 hours	3
Over 8 hours	9

The figures from the journey time question suggest that the journeys of ferry passengers are relatively long in terms of time with most lasting between 4 and 5 hours in duration. This is unsurprising given the relatively low speed of the mode as discussed in earlier chapters. Analysis of the data suggests a mean journey time of 4 hours 30 minutes.

In addition to the questions asked about the journey being undertaken some further profile questions were asked about the gender of the respondents, their age, employment status and income. The results of these questions for ferry passengers, as well as for those travelling by private vehicle, inter-urban bus, rail and air, are shown below.

Most of the travellers interviewed were male (63%) but there were also a considerable number of female travellers (37%). The age range of passengers is shown in Table 4.10.

Table 4.10 Passenger age range

Age range	Ferry	Private vehicle	Bus	Rail	Air
15 – 24	21	1	21	30	16
25 – 34	31	13	33	36	42
35 – 44	29	41	26	13	27
45 – 54	14	33	14	13	11
55 – 64	4	8	3	6	3
65 – 74	1	6	2	2	0
75 +	0	1	1	1	0

The response to the age question suggests that ferry passengers tend to be of a similar age to those using inter-urban buses and rail. A total of 81% of respondents were younger than 44 years of age, and 52% of ferry users interviewed are between the ages of 15 and 34.

6% of ferry users either owned or had access to a private car. This is lower than the figure for rail passengers (13%) and bus passengers (17%).

Table 4.11 Gross monthly personal income by mode

Gross monthly personal income (MWK)	Ferry	Private vehicle	Bus	Rail	Air
Under 20,000	14	0	18	28	1
20,000 – 50,000	14	0	18	12	-
50,000 – 70,000	20	5	16	5	-
70,000 – 100,000	14	8	8	4	-
More than 100,000	22	55	14	11	62
Don't know	9	25	24	29	14
Refusal	6	8	2	11	22

Table 4.11 indicates that ferry passengers interviewed tended to have slightly higher personal income per month than passengers using bus or rail services. Excluding respondents with 'Don't Know' or refused to answer, the average income for ferry passengers is around MWK75,000 compared to MWK61,000 for bus, and MWK 50,000 for rail. Whilst the ferry service is slow and relatively cheap, passengers' ability to pay therefore appears to be slightly higher than for other modes.

4.2.3 Freight transport

Based on the data provided by MSC the current demand for cargo transport using the lake services has declined in recent years from 30,000t in 2012 to around 5,000t now (Table 4.12 and Figure 4.2). This is a further decline from traffic recorded in the 1980s and 1990s. There are several reasons for the decline:

- The use of Beira port as a preferred port for export and import of goods from/to Malawi has kept Lake Malawi out of the main transport corridor;
- Inland Waterway Transport has suffered from increased competition from other modes of transport. With the development of the road and rail network, the lake services have fallen behind in terms of cost and reliability as they cannot offer a start-to-end service and relies on multi-transport modes; and
- IWT has suffered from a poor reputation.

Details of the type of cargo transported on the lake is not available but the cargo typically consists of construction material such as cement or clinker and agricultural products such as maize or fish.

Figure 4.2 Summary of MSC recent freight data in tonnes (1990 - 2016)

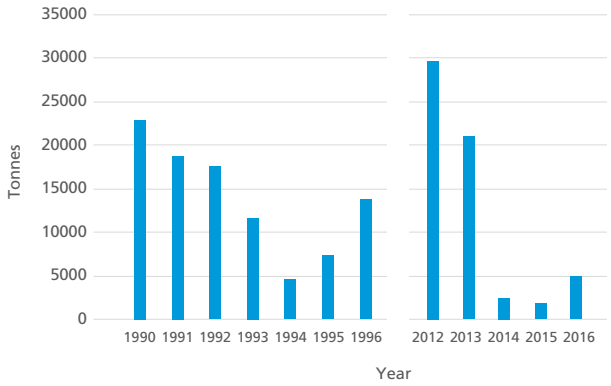


Table 4.12 MSC freight data in tonnes (2012-2016)

	2012	2013	2014	2015	2016
January	1,549	3,250	84	225	297
February	1,550	2,444	144	116	233
March	2,827	0	969	83	227
April	2,160	3,905	246	120	207
May	2,859	1,977	105	162	153
June	2,203	3,524	168	198	83
July	3,243	3,541	22	122	1,596
August	3,351	1,622	105	214	727
September	3,329	241	216	128	182
October	2,600	186	217	271	410*
November	3,251	173	134	172	1,019
December	650	378	78	213	0
TOTAL	**29,572**	**21,241**	**2,484**	**2,023**	**5,132**

**Note – record for October 2016 indicates 410,152t. This was identified as an error and indicated as 410t.*

Shipyard facility at Monkey Bay

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Malawi National Transport Master Plan

5 Transport costs

Inland Water Transport Sub-Sectoral Plan

5 Transport costs

5.1 Passenger fares

Passenger tariffs as of 2015 vary depending on the type of class and journeys. There are 5 classes of fare.

The fares indicated below are for the shortest journey (Usisya to Ruarwe or Ruarwe to Tcharo) and the longest journey (Monkey Bay to Chilumba) per person for one way:

- Economy class fares (MWK 750 to MWK 8700)
- Second class fares (MWK 1,250 to MWK 13,400)
- Upper deck class fares (MWK 2,500 to MWK 24,900)
- Standard cabin fares (MWK 3,650 to MWK 39,190)
- Owners cabin fares (MWK 6,450 to MWK 50,950)

Table 5.1 shows examples of the most frequently undertaken journeys for economy class travel.

Table 5.1 Example of passenger tariffs for economy class in 2015

Journey	Tariff (Economy class)
Monkey Bay to Makanjila	MWK 2,000
Makanjila to Senga Bay	MWK 1,500
Senga Bay to Nkhotakota	MWK 3,000
Nkhotakota to Nkhata Bay	MWK 5,120
Nkhata Bay to Likoma Island	MWK 3,500
Nkhata Bay to Chilumba	MWK 4,800

Average per kilometre passenger fares for rural transport are shown in Table 5.2. Inland water transport has the highest fare, but allows a passenger to carry 15kg of luggage which may not always be possible on a minibus.

Table 5.2 Comparison of passenger fares

Mode of transport	Average fare (MWK per km)
Rail	15
Minibus	22
Inland water ferry	25

5.2 Freight tariffs

Freight traffic tariffs are usually negotiated on an ad hoc basis but MSC has indicated the tariffs in Table 5.3 for transport on the MV Chilembwe in 2015.

Table 5.3 Freight tariffs for the MV Chilembwe in 2015

Description of goods	Rate [MWK/t.km]
Dry and fresh fish	500
Personal effects, groceries, timber, iron sheets, cement, lime, building materials.	400
Sugar and salt	450
Wheat flour, rice, beans, potatoes and other agriculture products	380
Maize, maize flour and cassava flour	300
Tinned food	350
Ice, cassava, fruits, vegetables and perishables	300
Cycles and bicycles etc.	400
Motor cycles, machinery and component parts for machinery	500
Volume cargo occupying large space: cotton bales, bales of clothes, etc.	800

5.3 Financial sustainability of the concession

Financial data was not made available to the consultancy team at the time of the study and it is therefore difficult to comment on the current financial viability of the concession. However, based on interviews, MSC have indicated that they have been losing money with the concession as the current freight operation using lake services has been very limited for various reasons, such as:

- Competition with the road sector;
- Political willingness to invest in the inland waterway transport sector;
- Companies' reputation for reliability (MSC and CEAR);
- Poor state of infrastructure; and
- Current low price of various commodities.

Very little capital investment has been made in order to limit current financial loss and the situation is not improving as a result.

It was indicated by MSC that the concession for passenger services does not allow the concessionaire to make a profit as the concession is not sustainable as it is. The current fleet of vessels is not adequate for the required service. There is not enough demand for many legs of the current route but MSC is obliged to maintain a minimum service under the concession. The revenue made by ticket selling does not cover the cost of operation (e.g. fuel, salaries, maintenance). In addition, the new vessel, MV Chilembwe is very expensive to run due to high fuel consumption. As a result, MSC only uses the MV Chilembwe as a replacement to the MV Ilala when out of service for maintenance.

Fishing vessels at Monkey Bay

Malawi National Transport Master Plan

6 Legal, institutional and regulatory framework

Inland Water Transport Sub-Sectoral Plan

6 Legal, institutional and regulatory framework

6.1 The framework

MLS has a virtual monopoly position on the commercial transport of passengers and cargo among Malawi's lake ports. Other private companies are also operating on the lake but there is no reference available. MLS used to be the Lake Services unit under Malawi Railways Limited (MR), then a statutory corporation owned by the Malawi Government.

As part of the process of commercialisation and concessioning of Malawi railways, the Lake Services was separated from the railway in the mid-1990s. In March of 1995, it was concessioned to Malawi Lake Services Limited[4], a limited company incorporated in Malawi under the Malawi Companies Act of 1984.

In order to improve the efficiency of service delivery, Malawi ports and shipping services are now operated under two concessions, both with the same major shareholder – Mota-Engil:

- MSC for shipping services under a 35-year concession agreement from 2010; and
- MPC for the management of ports from 2012, also for 35 years.

The Inland Water Transport Sub-Sector is regulated by the DMS, which also runs the Marine Training College at Monkey Bay. The College trains marine engineers and navigation officers. The responsibilities of the DMS, MSC and MPC are summarised in Table 6.1.

The Malawi Inland Waters Shipping Act (1995) provides a legal framework for the water transport industry in Malawi. This Act makes provisions for the survey, registration, licensing and ships that navigate on waters declared as such and provides rules relative to navigation by ships on inland waters and related matters. Various provisions of this Act relating to construction, equipment, survey and inspection also apply to fishing vessels. The Act provides rules concerning the carriage of dangerous goods and the disposal of illegal dangerous goods. It grants certain regulation-making powers to the Minister, including the power to make regulations to prevent pollution from ships and, after consultation with the Minister responsible for matters of the environment, to make regulations to prevent and control pollution of the marine environment. To make regulations to prevent and control pollution of the marine environment.

4 Part of Glens Waterways. Concession terminated in 2009 by the Government of Malawi.

Table 6.1 Summary of inland waterway institutional responsibilities

DMS	MSC	MPC
▪ Regulation of maritime transport services ▪ Provision of maritime training ▪ Provision of administrative and general support ▪ New port infrastructure	▪ Transport freight for customers ▪ Provide passenger services on the inland waters of Malawi ▪ Provision and maintenance of vessel fleet	▪ Operation of the 4 ports identified under the Shipping Act ▪ Maintenance of port infrastructure and equipment

6.2 **Policy and current interventions**

The National Transport Policy supports the draft Malawi Inland Waters Shipping Bill and its goal is to encourage an efficient and productive maritime transport system that will contribute towards local and international trade and tourism and ensure safety of life and property and the prevention of pollution of the environment.

The main objectives of the policy are:

- to improve safety of vessels; and
- to improve efficiency of ports and to improve accessibility to ports and inter modal linkages.

The general objective of the National Transport Policy with regard to IWT is to facilitate efficient and economic inter-linkages with other modes, where economically feasible, in order to foster and sustain accessibility and ensure the safe, affordable, reliable movement of people and goods. A summary of related policies and interventions are provided in Table 6.2 along with observations on each.

Table 6.2 Summary of policies and interventions

Policies	Current intervention	Observations
General Policies		
Encourage the private sector to promote the development and operation of an economically justified transport system for lakes and major rivers.	Creation and privatisation of Malawi Shipping Company in 2010. Concession given to Mota-Engil. Malawi Shipping Company has kept a regular passenger service across the lake and put a new ferry in service (MV Chilembwe).	Concession not sustainable as it is as the current routes and inadequacy of vessels have impeded the development of an economically viable passenger service.
Promote private enterprise in port operations in a manner that provides the most cost effective services, including the development and operation of cargo handling facilities.	Creation and privatisation of Malawi Port Company in 2013. Concession given to Mota-Engil.	Very limited investment in the current port facilities making the operation inefficient and not reliable. Freight transport cannot compete with road sector at the moment.
Ensure effective monitoring and regulation of the sub-sector.	The marine services have been set up to regulate the maritime transport policy.	Effective monitoring and regulations not enforced.
Inland Shipping		
Encourage the continued operation and strengthening of the lake shipping network to meet International Maritime Conventions and national regulations, including remote lakeshore areas.	The concession imposes a minimum passenger PSO to serve northern villages and Likoma.	The services do not appear to meet the IMC standards regarding safety. Poor infrastructure facilities limit the shipping network.
Promote marine safety and environmental protection.	Hydrographic survey commissioned and program to develop solar navigation aids.	New hydrographic surveys not always used. The solar panels have been vandalised and now been replaced by gas. However, due to the lack of funding the lighthouses are regularly not functioning.

Policies	Current intervention	Observations
Inland Shipping (Continued)		
Ensure that ports provide facilities for reception of shipping waste and that vessels comply with environmental regulations, particularly regarding solid and liquid waste disposal.	N/A	None observed at the various ports visited.
Improve port productivity, marine safety, operational efficiency and commercial viability of lake services.	N/A	Port facilities and vessels are not adapted to meet the required type of cargo. No marine search and rescue plan in place. Lack of training for port operation.
Ensure that free market forces dictate the entry and exit of players and the setting of price structures in the provision of shipping and port services.	Under the concession, MSC have the freedom to plan and provide freight services on a commercial basis and set tariff procedures and conditions of transport.	There is no competition for lake services.
Commercialise and privatise ports and improving cargo handling equipment and infrastructural availability and reliability.	N/A	Equipment not adapted to the required type of cargo.
International Shipping		
Foster increased participation by the Malawi private sector in international shipping in order to contribute to economic development and the promotion of foreign trade.	N/A	Some engagement with neighbouring countries.
Multimodal Transport		
Improve the rail and road links to ports and inter-modal transfer facilities.	Various plans for inland dry port facilities.	Only one port is connected to rail network but Chipoka not currently operational.

Dry dock and berthing facilities at Monkey Bay

Malawi National Transport Master Plan

7 Situation analysis

Inland Water Transport Sub-Sectoral Plan

7 Situation analysis

A situation analysis was conducted for the Inland Water Transport sub-sector using the SWOT Analysis technique. The analysis used the information above and drew from existing reports, interviews of Malawi Shipping Company (MSC) and Department of Marine Services (DMS) conducted in Malawi and feedback received during an IWT workshop held in September 2016.

It considers the internal (strengths and weaknesses) and external (opportunities and threats) factors that impact on the provision of efficient and effective IWT services. The analysis is shown in Table 7.1.

Table 7.1 IWT sub-sector SWOT analysis

Strengths	Weaknesses
▪ Well suited for transport of dry bulk, general cargo and heavy loads ▪ Lake Malawi is navigable and has navigable routes already in place ▪ Existing port infrastructure already in place ▪ Long history of transport over the lake ▪ Low environmental impact ▪ Low transport cost although this is not the case at present (vessels not well suited, poor handling operation, poor connections to other modes of transport)	▪ Needs for transhipment at ports and transport at each end (road and rail) ▪ Reliable on rail/road network ▪ Poor links to rail network. Only one connection at Chipoka currently and the port is not operational. ▪ Not very flexible mode of transport ▪ Poor Aids to Navigation ▪ Limited fleet and not always fit for purpose ▪ State of current port infrastructure ▪ Low speed of operation ▪ Dependant of natural factors (water levels, storms…) which can occasion downtime ▪ Lack of training for operators including lack of funding for training ▪ Lack of maintenance ▪ Unsuccessful private participation to date
Opportunities	**Threats**
▪ Some markets located close to waterway ▪ Economy of scale ▪ Opportunity to integrate with a multimodal network ▪ Proposed Mtwara corridor to make use of the lake ▪ Improved traffic safety ▪ Good potential to attract tourism ▪ Potential to reduce journey times and cost for each west movement across Lake Malawi	▪ Road transport is currently the preferred mode of transport and seen as more reliable ▪ Poor user perception and current reputation of IWT ▪ Water level of Lake Malawi have been low ▪ IWT dependant of integration and development of railway network. ▪ Tanzania developing new transport links (this can be seen as an overall opportunity for development of IWT in the region though)

Linkspan bridge at Monkey Bay

Malawi National Transport Master Plan

8 Future demand of IWT

Inland Water Transport Sub-Sectoral Plan

8 Future demand of IWT

8.1 Future passenger demand

It is currently difficult to envisage a large growth in passenger demand using lake services as IWT will always suffer from competition proposed by road services. This is particularly true for long haul services (i.e. North to South service).

There is however some potential for growth for short haul services crossing the Lake Malawi east to west. This is particularly true between the Malawi land area and the islands (Likoma and Chizumulu) where the only alternative mode is an expensive air service.

The passenger demand presented in Table 8.1 for the next 20 years indicates that the most popular ferry segments are between Nkhata Bay, Likoma and Nkhotakota in the central region. The model outcome shows minimal demand for travel in other segments. However, based on stakeholder interviews and a workshop conducted during this study, there is some demand to travel between Senga Bay and Makanjila in the South and up to Mulowe in the North. Also, it should be noted that travel is conducted on the lake using private vessels, but that there is no record of the number of passengers using these.

It should be emphasized that future passenger demand, and increases in demand, will be focused on Likoma and Chimuzulu islands, since there is no alternative mode of transport, except very limited and costly air travel. On other segments where IWT ferries currently operate, road transport is now offering a cheaper and more frequent service.

Table 8.1 IWT passenger demand (weekly)

Ferry Terminal	2021		2026		2031		2036	
	Boarding	Alighting	Boarding	Alighting	Boarding	Alighting	Boarding	Alighting
Nkhotakota	52	86	54	90	55	92	57	95
Likoma	267	140	274	142	283	147	289	149
Nkhata Bay	88	181	88	184	92	191	92	195

It is to be noted that the total forecast demand is based on the current service, which stops twice a week at each location but only once in each direction. It would therefore be reasonable to assume that the maximum demand is in the order of 300 trips (289 boarding at Likoma to the mainland at Nkhata Bay).

Other potential for growth includes:

- International passenger transport with Tanzania and Mozambique; and
- Tourism.

8.2 Future freight demand

According to the UN comtrade website , the top exports of Malawi in 2014 (Table 8.2) were:

- Raw tobacco ($639.3M equivalent to 255,720t);
- Tea ($74.3M equivalent to 46,437t);
- Raw sugar ($60.9M equivalent to 87,000t – note that sugar is also for local market and 2009 figures indicate total volume produced of 280,000t);
- Ground nuts ($46.1M equivalent to 35,461t); and
- Uranium ($40.1M equivalent to 645t).

Other export commodities include dried legumes ($26.5M equivalent to 26,500t), cotton ($16.5M equivalent to 8,684t) and construction equipment.

In addition to the exported commodities, Malawi produces maize (around 3 to 3.5Mt per year), cassava (around 3Mt/year), sweet potatoes and potatoes (around 3.5Mt/year), pulses (around 400,000t/year) and rice (around 100,00t/year), which are intended for the local and regional markets only. All estimated volumes are extracted from the 'Malawi Transport Sector Multimodal Development and Potential Public Private Partnership Study' dated 2010.

Malawi's top imports (Table 8.3) are:

- Petroleum products ($359.2M equivalent to 256,571t);
- Packaged medicaments ($184.5M equivalent to 4,118t);
- Nitrogenous fertilizers ($134.3M equivalent to 223,833t);
- Mixed mineral or chemical fertilizers ($69.2M equivalent to 98,857t); and
- Cement ($58.9M equivalent to 294,500t).

3 https://comtrade.un.org/pb/CountryPagesNew.aspx?y=2015

Table 8.2 Malawi top 10 export commodities 2012 to 2014 (extract from UN comtrade)

HS code	4-digit heading of Harmonized System 2007	Value (US$ million)			Unit value				SITC code
		2012	2013	2014	2012	2013	2014	Unit	
2401	Unmanufactured tobacco; tobacco refuse	636.1	562.6	639.3	3.4	4.1	2.5	US$/kg	121
2612	Uranium or thorium ores and concentrates	131.3	136.6	40.1	87.6	81.0	62.1	US$/kg	286
0902	Tea, whether or not flavoured	70.0	86.0	74.3	1.5	2.0	1.6	US$/kg	074
1701	Cane or beet sugar and chemically pure sucrose, in solid form	41.8	114.2	60.9	0.4	0.6	0.7	US$/kg	061
1202	Ground-nuts, not roasted or otherwise cooked, whether or not shelled or broken	41.7	60.3	46.1	1.0	1.3	1.3	US$/kg	222
0713	Dried leguminous vegitables, shelled, whether or not skinned or split	42.6	29.0	26.5	0.6	0.7	1.0	US$/kg	054
5201	Cotton, not carded or combed	40.8	19.4	16.5	1.6	1.7	1.9	US$/kg	263
9999	Commodities not specified according to kind	0.0	0.3	63.1					931
8426	Ships' derricks; cranes, including cable cranes; mobile lifting frames	0.0	0.1	52.2		0.1		min US$/ unit	744
8429	Self-propelled bulldozers, angledozers, graders, levellers, scrapers	2.9	5.2	37.4	58.0	5.5		thsd US$ /unit	723
	All commodities	**1182.9**	**1208.0**	**1341.9**					

Table 8.3 Malawi top 10 import commodities 2012 to 2014 (extract from UN comtrade)

HS code	4-digit heading of Harmonized System 2007	Value (US$ million)			Unit value				SITC code
		2012	2013	2014	2012	2013	2014	Unit	
2710	Petroleum oils, other than crude	314.2	389.2	359.2	1.2	1.4	1.4	US$/kg	334
3102	Mineral or chemical fertilisers, nitrogenous	185.9	211.8	134.3	0.8	0.7	0.6	US$/kg	562
3004	Medicaments (excluding goods of heading 30.02, 30.05 or 30.06)	156.4	161.7	184.5	38.4	38.0	44.8	US$/kg	542
3105	Mineral or chemical fertilisers	77.9	119.8	69.2	0.7	0.8	0.7	US$/kg	562
2523	Portland cement, aluminous cement, slag cement	52.7	63.7	58.9	0.2	0.2	0.2	US$/kg	661
8703	Motor car and other motor vehicles principally designed for the transport	52.6	58.9	54.5	9.3	7.0	5.6	thsd US$/unit	781
2401	Unmanufactured tobacco; tobacco refuse	23.6	86.0	54.5	1.9	3.5	3.2	US$/kg	121
1001	Wheat and meslin	31.7	87.4	40.6	0.5	0.5	0.5	US$/kg	041
4907	Unused postage, revenue or similar stamps of current or new issue	29.5	55.6	54.5	64.8	117.7	165.4	US$/kg	892
8704	Motor vehicles for the tranport of goods	48.9	40.8	39.2	8.7	11.8	14.0	thsd US$/unit	782
	All commodities	**2330.4**	**2844.6**	**2774.4**					

The potential for moving these exported and imported commodities using IWT is shown in the tables below.

Table 8.4 Malawi export commodities – IWT potential

Commodity	Volumes (t)	Origin	Destination	Current mode	IWT potential
Raw Tobacco	255,720	Mzuzu	Durban, Nacala, Beira	Road	No
Tea	46,437	Nkhata Bay and South	Durban	Road	No
Sugar	280,000	Nkhotakota and Nchalo	Local/regional market and Nacala, Beira	Road and Rail	Yes, but tried on a number of occasions to secure a contract with Illovo and failed
Ground Nuts	35,461	Across the country	Local and various	Road	No
Uranium	645	Kanyika (North)	Walvis Bay	Road	No
Dried legumes	26,500	Across the country	Various	Road	No
Cotton	8,684	Salima and Shire River	Beira and Durban	Road	Limited

Table 8.5 Malawi commodities for local and regional market – IWT potential

Commodities	Volumes (t)	Origin	Destination	Current mode	IWT potential
Maize	3,500,000	Central and Southern regions	Local and regional market	Road	Limited
Cassava	3,200,000	Nkhotakota	Local and regional market	Road	Limited
Sweet Potatoes and Potatoes	3,500,000	Northern region	Local/national market	Road	Limited
Pulses	383,000	Central region	Nacala and regional market	Road	Limited
Rice	100,000	Around the lake	Regional	Road	Yes

Table 8.6 Malawi import commodities – IWT potential

Commodities	Volumes (t)	Origin	Destination	Current mode	IWT potential
Petroleum Products (2017/18)	27,360	Nacala	Various fuel depot across the country	Rail	None
	152,280	Beira	Various fuel depot across the country	Road	None
	87,000	Dar	Various fuel depot across the country	Probably road, encouraged to use rail to Mbeya	Old route from Chilumba - Chipoka by tanker vessel (MV Ufulu) but currently laid up. Ports not in good shape
Fertilizers	322,690	Beira, Nacala and Durban	Agriculture production areas	Road	Yes
Cement and Clinker	294,500	Regional (Tanzania, Zambia…)	Across the country	Road	Yes

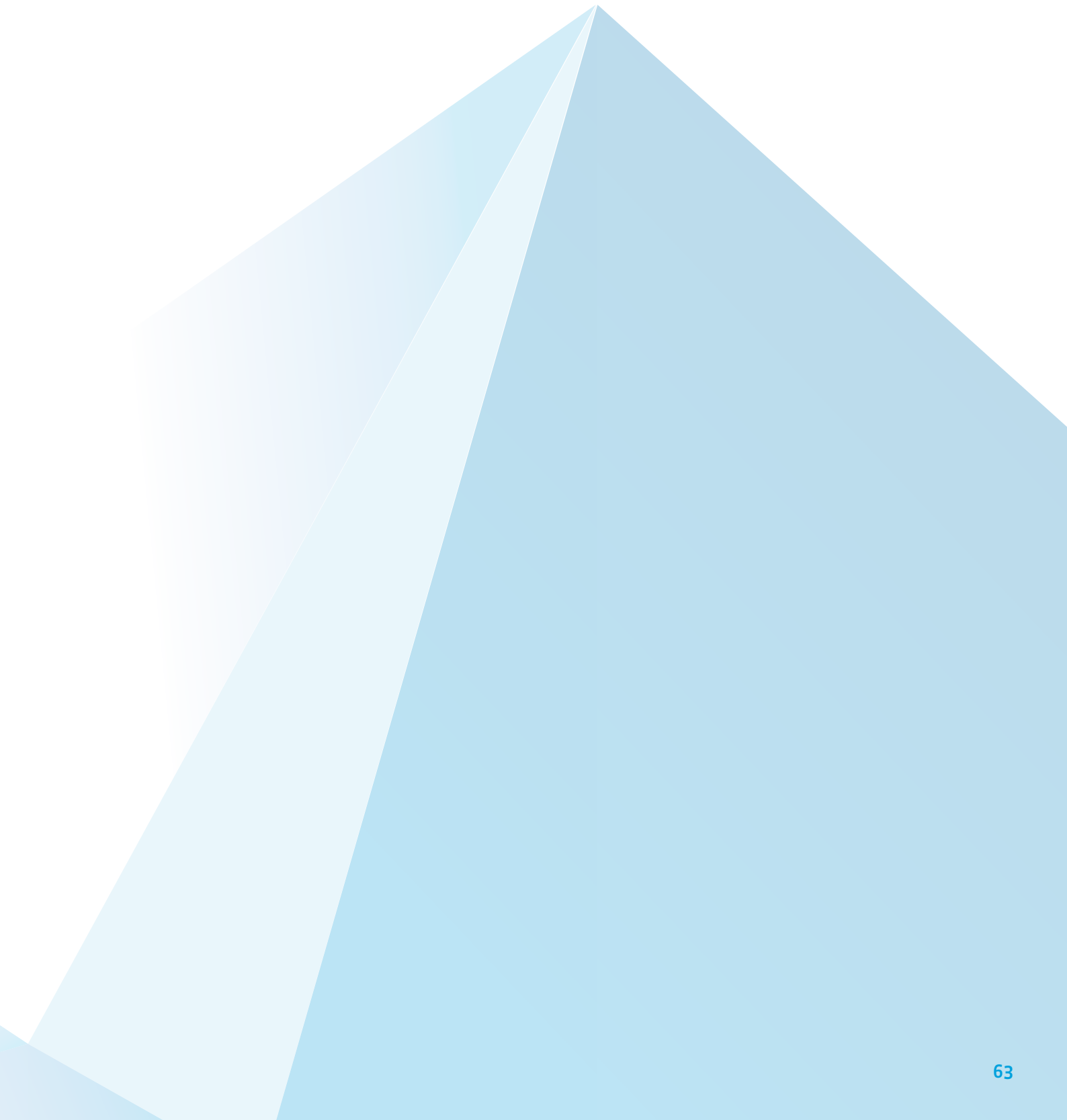
As identified in the tables above, there is a potential for moving the following cargo using IWT:

- **Sugar** cane is currently being grown in the central province around Nkhotakota and in the southern province in Nchalo. Although the southern estate is located close to the Lower Shire River and used to transport sugar by barge down the Zambezi River to Chinde, the section of the Lower Shire River is not currently navigable and it would require a large capital investment to change this. The northern estate has more potential for the use of lake services as the Dwanga sugar mills are located 25kms from Lake Malawi. There is a disused loading jetty at Nkhotakota (50km), which could be rehabilitated or replaced. The sugar could then be shipped to Liwonde or Chipoka and connected by rail to the Nacala corridor. MSC tried on a number of occasions to secure a contract with Illovo and failed. This is probably due to the unreliability of the rail and lake services.
- **Rice** is currently being produced in low volumes but has a potential to expand. As its production is taking place around Lake Malawi, IWT would be a logical transport means for distributing bags across Malawi or into neighboring countries (Tanzania and Mozambique). About 25,000 tonnes out of 100,000 tonnes produced in 2105 were grown in Karonga/Chitipa and therefore could go on the lake from the north to Salima/ Chipoka for access to the Lilongwe market.
- **Fertilizers** are essential to support agricultural sector development. They are currently being imported in bags via Mozambique and South Africa mainly by road and there is potential to link it to IWT at Chipoka and Liwonde if transported via rail for distribution to the northern region.
- The demand for **cement and clinker** (for production of cement) is growing to support the development of infrastructure projects across Malawi. It is currently being sourced from Tanzania and other countries in the region. MSC is currently negotiating a large contract to transport cement with Lafarge from Tanzania to Monkey Bay and there is a large potential for transport using lake services.

In addition, there is some, but very limited, potential for the following commodities to be transported by IWT:

- **Cotton** is being produced along the Shire River and Lake Malawi. Volumes are currently too low to consider using IWT.
- **Maize** is a very important commodity and is used as a basic daily food in Malawi. Maize is currently being transported by road in bulk form or bags. Maize is grown almost everywhere in Malawi, so there is no real need for mass transport. It is often consumed locally, or milled relatively locally, bagged and sold within the region. Excess maize is not supposed to be exported but stored. Maize shortages lead to the need to import from neighboring countries like Zambia where IWT potential is limited to the northern villages only.
- **Cassava, sweet potatoes and potatoes** – these agricultural products are currently being produced in the central and northern regions. There is a cassava starch processing facility in Nkhotakota and the northern region is a big producer of sweet potatoes. However, despite the large volumes being produced, there is currently limited opportunity to market these products to the southern region.
- **Pulses** production centres are not close enough to the lake to make IWT an economic transport solution.
- **Petroleum products –** There is a large demand for refined petroleum product in Malawi. During the civil war in Mozambique, petroleum products used lake services between Chilomba and Chipoka as the product was being imported from Dar es Salaam and the road network in the north was not fully developed. Petroleum products are now being transported by road mainly from Beira. The change of transport mode required with IWT does not make it a viable option relative to road and rail transport.

There is an unexploited potential for developing Malawi's mining sector. There are coal mines in the north (Karonga) and heavy mineral sands on the lake shore at Makanjila and Salima. IWT would be a key transport link should these mining projects be developed. However, current logistics and power/energy shortages have not made these projects viable.



Water level gauge at floating dry dock

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Malawi National Transport Master Plan

9 Strategies for enhancing the sector as an enabler for reducing transport cost

Inland Water Transport Sub-Sectoral Plan

9 Strategies for enhancing the sector as an enabler for reducing transport cost

9.1 Overall strategy

The transport services available on Lake Malawi have declined over the last few decades. This is mainly due to road network expansion including on the Lake Malawi shores, which used to be undeveloped at the peak of IWT in the 1980s.

While other transport modes have evolved, IWT has not made any progressive changes in response to the stiff competition presented by road transport and has lost market share as a result.

The transport services on the lake have also been affected by changes in economic and political circumstances, which have impacted on trades and traditional transport corridors. Currently, services are mainly focused on meeting public sector obligations to remote communities. IWT cannot compete against other modes of transport on its own and should seek to form part of an integrated transport chain.

The overall strategy to meet the NTMP and revive IWT should consist of the following:

- Consolidation and implementation of established policies;
- Promotion of private investment through the concession;
- Regional integration; and
- Reduction of the IWT costs.

9.2 Consolidation and implementation of established policies

As detailed in Chapter 7, a set of policies have been drafted to encourage an efficient and productive maritime transport system that will contribute towards local and international trade and tourism and ensure safety of life and property and the prevention of pollution of the environment. These policies have only been partly effective as they have not been properly enforced. They are introduced in Table 9.1 along with proposed improvements.

Table 9.1 IWT policies and associated issues and proposed improvements

Policy	Current issue	Improvement proposal
International Maritime Conventions and national regulations including environmental regulations.	Vessel and operation do not fully comply with regulations which are not currently properly enforced.	Government department to enforce regulations with increased local presence, increase cooperation with private sector and adequate funding.
Marine Safety	Lake navigability and maritime safety have not been sufficiently addressed.	Update navigation charts, maintain and upgrade aids to navigation, improve vessel safety and provide search and rescue facilities.
Port productivity, operational efficiency and commercial viability of lake services.	Adequate infrastructure or equipment is not available. Only 2 ports are operational. Lack of proper training to operative and management.	Invest in equipment and vessels fit for the required service. Provide adequate training.
Free market and setting of price structures.	The current concessionaire has virtual monopoly on operation over the lake services.	Revise the concession to introduce competition and drive price down.
Privatisation and reliability	No investment in new or upgraded port infrastructure or vessels. Poor reputation.	Develop a credible business plan and make necessary investment.
International shipping and promotion of foreign trade.	Insufficient participation in international trade.	IWT to be linked to regional transport corridor.
Rail and road links	Poor connection to rail and road networks. Only one port (not operational) directly accessible by rail.	Target key ports for multi-modal integration. Coordinate all sub-sectors plans.

9.3 Promotion of private investment through the concession

One of the main policies is to encourage the private sector to promote the development and operation of an economically justified transport system for lakes and major rivers. This was partly achieved with the creation and privatisation of Malawi Shipping Company in 2010 when the concession was given to Mota-Engil. However, the concession and private sector participation have not been entirely successful to date. The concessionnaire has indicated that they are losing money over the operation of the ports and shipping lines. As a result, investments in the sector have been limited.

In order to revive the IWT sector, a reform of the current concession is required to take into account the proposed interventions below.

9.4 Regional integration

IWT revival will likely depend on economic development in northern Mozambique and southern Tanzania, and in particular the development of major anchor projects within the Nacala and Mtwara Corridors. In addition to the Durban transport corridor, there are currently 4 transport corridors linking Malawi to seaports in Tanzania and Mozambique:

- Dar es Salaam corridor;
- Mtwara corridor;
- Nacala Corridor; and
- Sena (Beira) Corridor.

These are introduced in turn below.

9.4.1 Dar Es Salaam Corridor

The Dar es Salaam corridor has historically been selected as the preferred route to transfer goods via Dar es Salaam port during the civil war in Mozambique. Lake Malawi is not directly linked to the corridor. Chilumba port was constructed to handle general cargo, containers and petroleum product. The port is located on the northern shore of the lake some 200kms from Mbeya in Tanzania, which is connected to Dar es Salaam by rail. Multimodal transport involving rail, road and IWT makes it a long and complicated journey (see Figure 9.1) and the use of the Dar es Salaam port is not currently the preferred option, with other reasons including the increasing inefficiencies of the Dar es Salaam port.

Chilumba and Chipoka ports are currently partly operational. While Chipoka port has all the required infrastructure in place to transfer goods, the recent drop in the lake water level makes the facilities non-operational as vessels cannot berth at the quay. Dredging cannot be completed without undermining the existing quay wall structure and capital investment would be required to revive the port. Chilumba port would need investment in the equipment facilities.

An option for improving this corridor is to extend the rail link from Mbeya to Chilumba. The demand for this will be assessed.

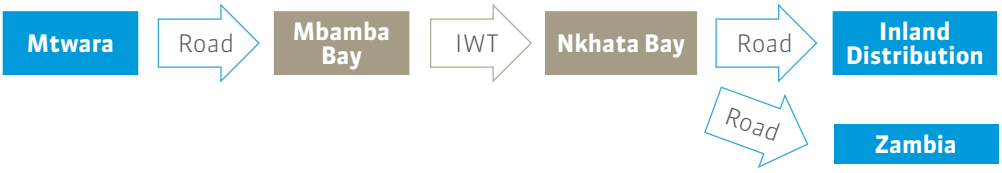
Figure 9.1 The journey from Dar Es Salaam port to inland distribution in Malawi

9.4.2 Mtwara corridor

The Mtwara corridor is not fully operational yet. It will link the Port of Mtwara in the South of Tanzania to Mbamba Bay on the Tanzanian shore of Lake Malawi (Figure 9.2). Lake Malawi will form part of the transport chain to link Mtwara to Zambia and this major project could be used to revive IWT connecting Mbamba Bay to Nkhata Bay, about 65kms across the lake.

It is envisaged that transport across the lake will be carried out using ro-ro ferries. Current facilities at Nkhata Bay cannot receive ro-ro traffic and a substantial upgrade of the port will be required, in addition to purchasing high capacity ferries to move cargo and passengers between the terminals. The AfDB is investing in this corridor through road projects in Mozambique and Mzuzu-Nkhata Bay.Mzuzu-Nkhata Bay.

Figure 9.2 Mtwara corridor



9.4.3 Nacala Corridor

Nacala corridor is now operational and links the Nacala deep-water port in northern Mozambique to Tete province in central Mozambique crossing southern Malawi (Figure 9.3). The railway is now operational and crosses the upper Shire River at Liwonde. There are current plans to develop a dry port at Liwonde and while Liwonde is not currently connected to the IWT network, a river port would be feasible and would link Lake Malawi to the rail corridor.

Figure 9.3 Nacala corridor

9.4.4 Sena corridor

Sena corridor is currently linking Beira port in Mozambique to Tete province in central Mozambique. The railway used to be connected to the Malawi rail network but the infrastructure is no longer in place and the railway into Malawi has been disused for many years. The current Sena railway line could be extended up to Nsanje in Malawi. A new landing site was built on the shore of the Shire River. However, the Middle Shire is not navigable and while this Sena corridor cannot currently be linked to the rest of Malawi's IWT network. This National Transport Master Plan has developed a rail based option to overcome this issue.

9.4.5 Shire-Zambezi Waterway

A river port was built at Nsanje on the Shire River with the view of exporting/importing goods by barge via the Zambezi River to Chinde in Mozambique. While the project looks attractive, there are many risks to its viability:

- Navigability of Shire-Zambezi Waterways and associated environmental implications. Dredging will be required for the Lower Shire;
- Construction of a transhipment port at Chinde;
- Political issues with the Government of Mozambique who might not be supportive of the project as it would affect Beira and Nacala ports; and
- Transport links from Nsanje to the rest of Malawi.

This is considered in section 10.1.5.

9.4.6 Regional transport corridor summary

Based on the above appraisal, IWT will be more suited to integrate the transport chain of the following corridors:

- Mtwara corridor with integration to the road network; and
- Nacala corridor with integration to the rail network.

9.5 Strategies for reducing IWT transport costs

There has been very little data made available to the consulting team regarding transport costs associated with IWT.

Under the current concession, MSC has to provide a regular ferry service to various localities across the lake. MSC have been losing money with passenger operations and the concession is not sustainable, and the MV Ilala has been running empty on various legs. The costs of running the service (mainly fuel consumption) have not been covered by the revenue generated from ticket sales. It has also been reported that controls to board ferries have not always been rigorous and that fare evasion can be a regular occurrence. The Chilembwe vessel, the latest addition to the fleet of passenger vessels (see Table 9.2), is fast and manoeuvrable but its design and high fuel consumption does not make its operation economically viable. It has a fuel consumption of 230 l/hr as opposite to MV Ilala with 75lts/hr. Increasing passenger fares will drive potential customers away.

The main issue with freight transport lies with the operational inefficiencies at the ports and low reliability of the service. This has created delays with moving cargo and resulted in standing time costs. Poor integration of the ports with the rail network and a low level of training have also created some operational inefficiencies leading to increased costs. Vessels need to be adequate for the type of commodities that they transport and be of various sizes and types to allow efficient loading and unloading operations and to travel full.

IWT is usually well suited for the transport of dry bulk, general cargo and heavy loads on long distances and the strategy should focus on this market. Small volumes and short distances cannot compete with road transport as they require transhipment at ports and transport at each end by road and/or rail. It has also been observed that MSC has not managed to operate a regular freight service (even seasonal) and relies on an ad hoc service.

The strategy for reducing IWT transport costs consists of the following:

- Passenger transport to focus on popular route segments. Less popular segments should be covered by a reduced service and smaller vessels;
- Fleet of passenger vessels to be adequate for required service (i.e. low fuel consumption, low draft or ro-ro type vessels that can berth directly on the beach as berthing facilities are not available at all locations);
- Improvement of operation at ports with better suited equipment, trained staff and better connection to rail network;
- Strategy to focus on large volumes and long distances;
- Establish regular service and route for freight; and
- Adequate freight vessels and various type and size to cover various markets and size to cover various markets.

Table 9.2 Vessel fuel consumption

VESSEL	Year built	Length (m)	Passenger capacity	Cargo capacity metric	Power (Kw)	Fuel consumption	Engine make
Chilembwe	2014	35.30	120	20t	895	230 lts/hr	Caterpillar
Mtendere	1980	50.7	420	45t	720	115 lts/hr	Cummins
MV Ilala	1951	52.4	354	100t	677	74.36 lts/hr	Caterpillar
Katundu	1991	61.5		750t (48teu)	900	76 lts/hr	Caterpillar
Nkhwazi	1955	34.6		200t	280	25 lts/hr	Crossley
Karonga	1975	43.1		300t	180	25 lts/hr	Caterpillar
Ufulu	1992	46.85		300+30t	760	115 lts/hr	Cummins
Viphya Tug /Pontoon	1975	16/63		600t	733	56 lts/hr	Caterpillar

Workshop for maintenance facility at Monkey Bay

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10 Proposed interventions

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10 **Proposed interventions**

10.1 **Physical interventions**

Specific interventions should be in relation to the development of major transport corridors where IWT can be integrated with the overall transport chain. Currently, IWT is not well connected to other transport modes. Chipoka is the only port connected to the rail network but is currently non-operational due to the low water level in the lake.

River/sea transport is only part of a transport chain as goods cannot be delivered door-to-door by water and instead require multi-modal transport links with road and rail. Modal interchange takes place at the various rivers/lakes and ports that can accommodate several transport modes such as road or rail for inland distribution. There are various criteria to establish a good modal interchange port location::

- The markets to be served by IWT are located close to the waterway;
- Large site that can accommodate A logistic centre for dispatching of freight;
- Possess good access to rail and highway networks;
- Have easy access to an appropriate labour supply (i.e. close to an important city or settlement); and
- Minimise impact to the local environment.

The Malawian railway network does not extend to the north of the country and the required capital investment cannot be justified in the context of current demand. As indicated in Figure 10.1 the railway network passes close to navigable waterway at only 2 locations: Chipoka and Liwonde. These are the only available locations for connection to the rail network and transport to/from Nacala port. As previously mentioned, Chipoka port already has a connection to the rail network but the port is not operational as vessels cannot currently call at the port due to the low water levels. A consequent capital investment would be required to rehabilitate the port as construction of deeper berth is likely to be required as dredging alone would undermine the current quay wall. Liwonde does not currently possess berthing facilities. The upper Shire River is navigable (subject to a feasibility study and investment in aids to navigation) and it appears feasible to build a new river port which would be linked to the railway network and Nacala corridor as well as the rest of the IWT network.

The northern ports would only rely on the local road network for local distribution and international transfer. Nkhata Bay would require investment as the Mtwara corridor becomes operational and subsequent ro-ro transfer service with Tanzania (Mbamba port) is established.

Specific interventions can be categorised as follows: major interventions (estimated capex of US$5 to 25 million), medium interventions (estimated capex of US$1 to 5 million) and small interventions (estimated capex < US$1 million). Their locations are shown in Figure 10.2 and they are each described below.

Figure 10.1 Current rail network

Legend

- Major urban areas
- River Shire
- Major lakes
- Country Boundaries
- Principal Line
- Proposed Line

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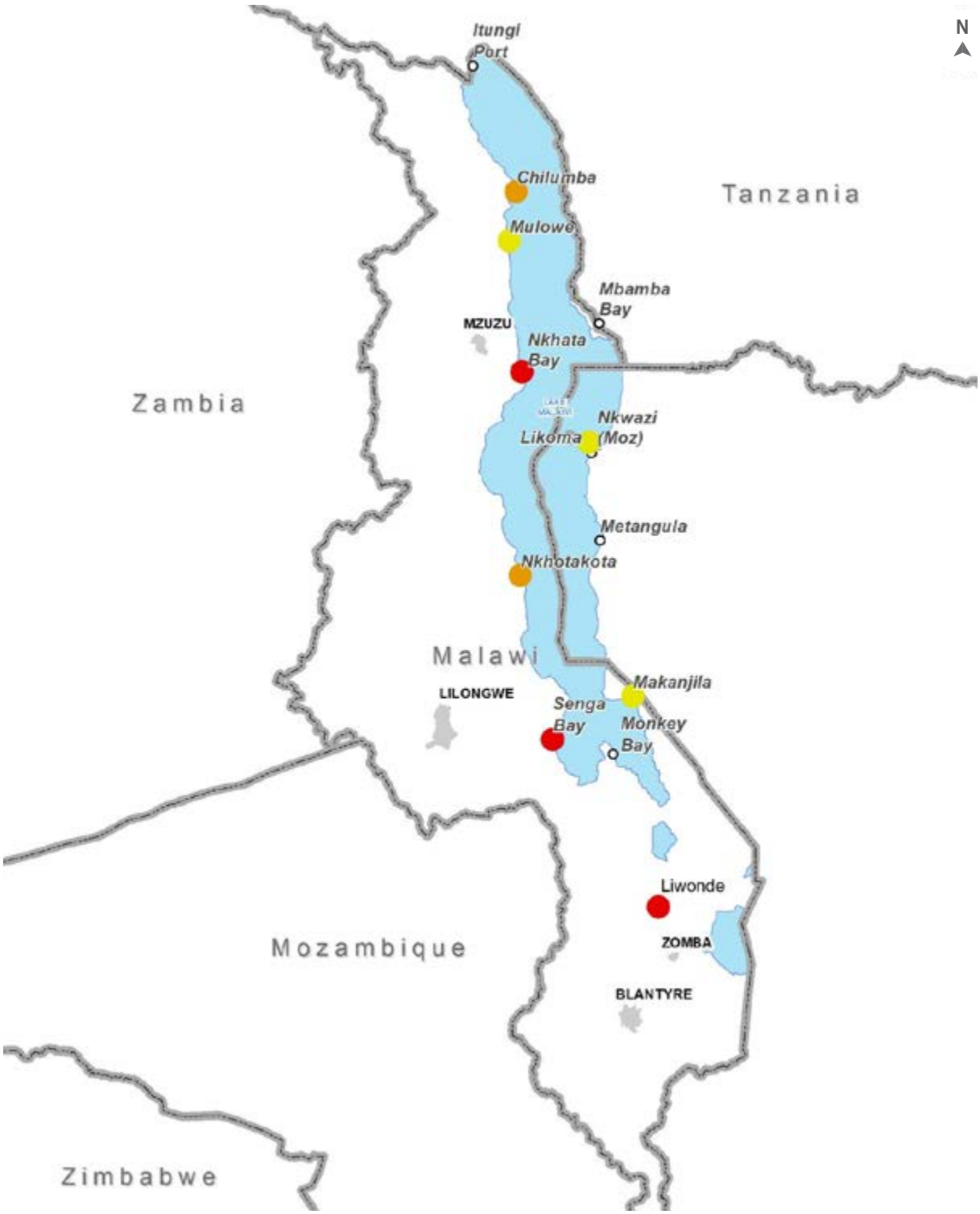
National Transport Master Plan

Figure 10.2 Identification of specific intervention



Legend

- Major intervention
- Medium intervention
- Small intervention

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Major interventions will comprise of the construction or rehabilitation of ports that could form an integral part of the existing or planned transport corridors. Recommended major interventions are described below.

10.1.1 Nkhata Bay port development

Due to its geographical position (proximity to the northern shore lake communities, Likoma islands and Tanzania), Nkhata Bay has the potential to become a maritime transport hub on the lake. The proposed interventions have an estimated cost of US$20 - 25 million, and would consist of the following:

- A new ro-ro berth to accommodate ro-ro traffic to/from Mbamba Bay (Tanzania), which will be linked to Mtwara port. Nkhata Bay would also be linked to the road network to Zambia. The size of the terminal and ro-ro vessels will be dependent of the demand forecast for ro-ro traffic across the lake and maximum size the dry dock can handle for vessel construction (an example is in Figure 10.3);
- Customs offices and warehouses;
- Parking space for lorries using the ro-ro terminal;
- A general cargo berth (either lo-lo or ro-ro) for freight service to other ports across the lake;
- New cargo handling equipment;
- Storage area;
- Maintenance workshop; and
- A dedicated passenger terminal for Likoma Island and Tanzania.

There are plans to develop new shipbuilding and ship repair facilities at Dindano in Nkhata Bay District at an estimated cost of US$75 million. Private sector investors are being sought, but there is little expectation of investment in the short term.

Figure 10.3 Large Ro-Ro vessel example

10.1.2 **Chipoka port development**

Chipoka port has the advantage of being the only port currently connected to the main rail network. However, as previously mentioned, the port is currently not operational due to the low water levels, which prevent vessels from accessing the facilities. As dredging alone is not feasible, as it could undermine the existing quay, alternative solutions need to be looked at. The proposed interventions are estimated to cost US$10 to 15 million and would consist of the following:

- Extension of the existing quay. This could be in the form of building a new and deeper sheet pile wall in front of the existing quay. Alternatively, the existing quay wall could be extended to deeper waters but this has the disadvantages of having a section of the berthing facilities made redundant;
- Dredging of a new access channel and at the berth (Figure 10.4);
- Siltation management; and
- New equipment to include bulk handling cranes and mobile cranes more adapted to bulk commodities.

Figure 10.4 Possible intervention at Chipoka port

Source: Google Earth

10.1.3 Liwonde port development

The only alternative site where the rail network passes next to inland waterways is at Liwonde on the Upper Shire River. There is scope to develop a new river port that will integrate to the railway network and link directly to the Nacala corridor. The proposed interventions are estimated to cost US$ 15 to 20 million, and would consist of the following:

- New general cargo berth;
- New storage yard, warehouses and handling equipment;
- New railway connection; and
- New navigation channel (potential dredging).

The new river port at Liwonde (Figure 10.5) might also benefit from the adjacent proposed dry port facilities at Liwonde. However, it is recommended that dry ports to be established at Blantyre and Lilongwe instead.

Figure 10.5 Liwonde site

Source: Google Earth

10.1.4 Fleet of vessels

In addition to the proposed interventions to the port infrastructure, construction of more efficient vessels to support passenger and freight transport is essential. The current vessels are not well fit for purpose and often too large for the operations that they're used for.

The passenger vessels should have a low fuel consumption, be flexible/navigable and be capable of landing on a beach in a similar way to the MV Chambo (Figure 10.6), which has a shallow draft and a dropdown ramp but is only operating in Mozambique.

Figure 10.6 MV Chambo

Source: Travel Malawi Guide

Ro-Ro vessels which are equipped with an aft ramp or a front ramp for loading and offloading vehicles, and Lo-Lo barges which require lifting equipment for loading and offloading cargo, are also more appropriate for freight transport. Depending on the size and type, the cost per vessel would be in the order of US$ 1 to 5million.

10.1.5 Shire-Zambezi waterway

The Shire - Zambezi waterway was successfully navigated to Malawi a century and a half ago. During that time, the port of call in Malawi was in Nsanje District, formerly known as Port Herald along the Shire River. As recently as 1970, Mawtam Ltd operated a barge service transporting molasses from Chiromo in Malawi to Chinde on the coast of the Indian Ocean in Mozambique. This operation was disrupted by the war in Mozambique from the early 1970s.

Glens Waterways Limited (formerly the company to which services on Lake Malawi were concessioned) conducted a prefeasibility study and aerial photography on the Shire and Zambezi Rivers. The results indicated that the rivers are navigable but require further studies to chart the navigation channel and develop waterway infrastructure. In October 1996 Glens Limited organized a survey by boat of the Lower Shire and Zambezi Rivers. The survey found the rivers still navigable all the way to the Indian Ocean. The survey team recommended technical investigations with a view to re-establish barge services

This project would entail re-opening the Shire and Zambezi Rivers to navigation in order to provide a direct waterway transport system between Nsanje in Malawi and the port of Chinde, a distance of approximately 340 km. A pre-feasibility study was conducted in 2006 and the results of the study again indicated that the rivers are navigable but require further studies.

A Memorandum of Understanding was signed by Malawi, Mozambique and Zambia in 2007 to develop and implement the waterway as a trans-boundary facility. The MOU provides for cooperation among the countries during the various stages of the development of the waterway and establishes appropriate consultative mechanisms.

SADC commissioned Hydroplan[4] to undertake a full feasibility study, and this reported in 2015. The study proposed two options for vessels to carry cargo on the river:

1. The use of barges and pushers to create a pushed convoy (Figure 10.7). The convoy would navigate from Nsanje to Chinde. At Chinde a platform wouldl need to be installed and used as storage and a transfer area between the barges and the coasters which would transport the containers from Chinde to Beira port; and
2. The use of special coasters which are able to move the containers from Nsanje to Beira port avoiding the transfer of Cargo at Chinde (Figure 10.8).

The preferred option of that study provided for a 1.5m water depth in the river, is the use of a pushed convoy, with a price per container carried of US$2,968.[5] The costs of dredging to maintain a 1.5m depth were estimated to be US$17.7 million (capital), and US$30 million per year (maintenance).

The study forecast that 1,060,000 tonnes of cargo would use the river in 2025, at an average cost of US$0.06 per tonne-km. This would give a gross annual revenue of US$21.6 million. The annual savings in transport costs between using the Shire-Zambezi compared to road would be in the range US$8.5 million to US$14.4 million. On this basis, the project's profitability would be marginal at best, and would require a subsidy.

Figure 10.7 Container convoy

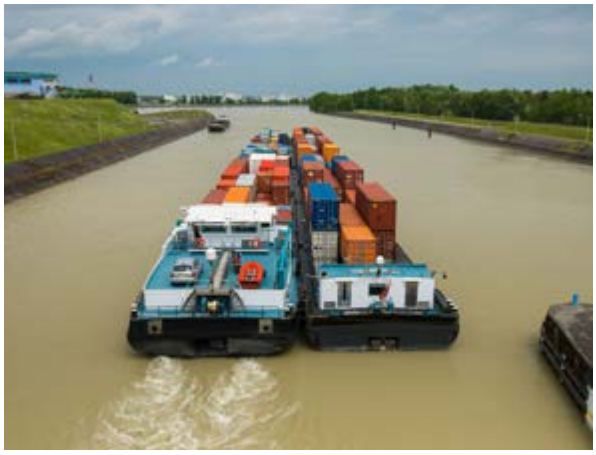


Figure 10.8 Self propelled barge

Source: Nibulon

4 *Southern African Development Community Secretariat – Multinational Malawi / Mozambique / Zambia – Feasibility Study for the Navigability of Shire-Zambezi Waterways – Consultancy Services: Executive summary, Hydroplan, 2015*

5 *This was 11% cheaper than the comparative road option, but more expensive than rail*

10.2 Other physical interventions

Medium interventions will comprise the construction of individual landings or equipment upgrade, specifically:

- Upgrade/construction of a dedicated landing pier for export of sugar at Nkhotakota; and
- Equipment upgrade at Chilumba port for loading/uploading of cargo.

Small interventions will comprise the construction of small landing passenger facilities where they are currently non-existent (Likoma island, Makanjila, northern villages), following an upgrade of passenger vessels.

10.3 Policy interventions

10.3.1 Safety and security

There are various issues associated with IWT safety and security, notably:

- It has been difficult to enforce safety regulations (such as the wearing of life jackets), which has resulted in several casualties. There is no combined regulation with Tanzania.
- There are no organised rescue services currently in place. Rescue operations are carried out by any vessels operating in the area. The army could carry out this duty but all their vessels are currently based in Chilumba.
- The available survey charts are from 1957 and not up to date. The Government of Iceland sponsored new hydrographic surveys for the Southern part of the lake in 2003. However, it has been reported that the new surveys are missing some features and are not accurate. Captains prefer to use the old charts.
- Shipping companies have been using the same routes for a long time and while there have been no particular concerns re features of the lake, knowledge of the lake is required for safe navigation.
- Lighthouses have been used as Aids to Navigation around the lake and the Government Marine Services is responsible for their maintenance. The solar panels have been vandalised and have now been replaced by gas. However, due to a lack of funding, the lighthouses are regularly not functioning.
- Informal services, especially passenger, operate without regulation or control.

The lack of safety measures has unfortunately resulted in casualties. The Department of Disaster Management Affairs released a press statement on Monday 17th April, 2017 to inform the public that a boat capsized at Mlowe on Lake Malawi in Rumphi District on Sunday, 16th April, 2017. 54 people survived after being rescued by people from surrounding communities, while some swam back to the shore. Five people have been confirmed dead, while 20 people are reported to be missing by their relatives. The official reason for the accident was bad weather but other factors contributed towards the boat capsizing. These include boat seaworthiness, the number of people on the boat, inexperience of sailing in such conditions, lack of life jackets available on the boat, no rescue services available nearby, and no Met ocean report warning of the weather conditions.

The following safety measures should be adopted:

- Training of seafarers is paramount to safety and they must understand operating procedures on-board ships;
- Enforced vessel registration to ensure that safe and legal vessels ply on the Lake and rivers;
- Co-ordination with the Director of Fisheries to prevent illegal fishing, particularly trawling, by unregistered vessels;
- The Malawi Communications Regulatory Authority (MACRA) should not assign distress frequencies to other radio stations;
- A co-ordinating centre to coordinate maritime search and rescue;
- Marine Police to be improved and equipped to respond quickly to emergencies;
- Establish search and rescue teams in all strategic places along the lake to respond to emergencies;
- Registration of vessels to ensure they abide by rules of safety;
- Continued sensitisation of canoe users regarding safety;
- Lighthouses to be replaced where not functioning;
- Sensitisation against vandalism;
- Lake to be re-charted;
- Ship operators to use electronic data navigation in future; and
- Decentralisation of DMS to lake-shore districts.

10.3.2 Capacity building

10.3.2.1 Government

Malawi has one marine college located in Monkey Bay. It belongs to the Government and used to be under the rail department when rail and maritime were together. The college has the capacity for 30 students and 12 teachers. It is currently operating under capacity with 5 teachers for 19 students. It provides an advanced diploma in marine engineering and marine navigation. At the end of the courses, most of the students join the shipping company or the fishing company. In addition, the college trains the police and army. The college also provides training for the local community, notably for a tourism boat to allow skippers of the boats from resorts to get a certification for navigation/operation. Previous funding sources have included: JICA for navigation simulation and trainers; Government of Iceland for new library and buildings in 2002; IMO, which sent an engineer/navigator for training.

A lack of funding for capacity building has been a key issue for many years and funding from the Government has been cut by half in recent years. The following consequences were observed during the study:

- Upgrading the facilities is impossible and keeping up with newest technology is difficult, particularly as there is no internet connection;
- Teachers are not being replaced as the Government is cutting funding to the college;
- Students have to pay for their own tuition fee or have a sponsor;
- As part of the concession agreement (41.1.3.), the Malawi Shipping Company is to invest 1% of all gross revenue towards new equipment, rehabilitation and operation of the marine college but this has rarely been the case over the last few years; and
- Lack of training for stevedores. Several unfortunate events took place in recent years at Chilumba and Nkahata Bay making facilities not operational due to human error.

There is a constant need to provide appropriate staffing, training, buildings and other facilities to undertake operation, maintenance and management of the lake services. The marine college provides a good base to enhance capacity building across the maritime sector. However, it needs regular and sustainable funding to provide the much needed training in the sector. There are 3 key areas that need to be addressed:

- Navigation and vessel operation;
- Port operation; and
- Maintenance of vessels and port infrastructure.

10.3.2.2 Under the Concession

It is desirable for a port to build a pool of maritime expertise in the operational and technical aspects of its business activities. This includes recruitment of new talent, and upgrading of skills and knowledge of the existing staff.

In addition to initial training, it is desirable for a manpower development plan to be developed and to consider productivity training for established employees. The port should put a priority on improving productivity, re-defining the business model to enhance efficiency and re-designing jobs as growth in technology occurs. Training on equipment, including that which is proprietary, is useful and should be stipulated in any contract for the purchase of equipment. Training throughout the warranty period is helpful in order to have a strong base of skilled staff.

Maintenance of vessels and port infrastructure is an issue. There is a lack of appropriate training. The tendency is to wait for vessels and infrastructure to break down before maintenance (reactive) rather than take a preventive approach. An asset maintenance plan is to be established.

There are shipyard facilities at Monkey Bay. Monkey Bay has the only floating docks for Lake Malawi (Figure 10.9) and neighbouring countries (Tanzania and Mozambique) use it for maintaining their fleet. The dry dock was

part of the concession and is operated by MSC (Motta - Engil). Monkey Bay is the main base for all vessels but is not considered to be the preferable geographical location for a central operation.

There are plans to develop new shipbuilding and ship repair facilities at Dindano in Nkhata Bay District at an estimated cost of US$75 million. This site used to be a paramilitary training base with a few gun boats. The site still remains Government property. Dindano is a natural harbour, deep and well sheltered, quite ideal for the establishment of a shipyard. The facilities shall include, among others, fully fitted workshops capable of designing, fabricating, fitting and painting different sizes of vessels for cargo, passengers, fishing, pleasure, tourism, patrol, research, dredging and similar. In addition, there shall be repair facilities and slipways for various vessels and the supply of spare parts. There shall also be warehouses and administrative offices to provide the necessary support services. The shipyard will have adequate technological capacity to design, construct, and conduct sea trials and commission different sizes and types of vessels which can be used for fishing, tourism, transportation of passengers and cargo, dredging, towing, patrols, ambulances, research and similar. The vessels will be made from any modern materials except wood. In addition, the shipyard will have ship repair facilities for various types and sizes of vessels. It will also supply and sell spare parts of various ship machinery, equipment and consumables.

The project objectives are:

- To provide the water transport, fisheries and tourism sectors in Malawi with a sufficient, affordable and appropriate fleet which can spur the economic development of the country; and
- To enhance Malawi's export drive as some of the vessels will be exported within the region.

The project will be under a Public Private Partnership (PPP) arrangement. The government will provide the land and local personnel while the concessionaire will provide the required capital for investment and the technical expertise, including the required naval architects and specialized engineers to construct and operate the shipyard.

Figure 10.9 Floating dock at Monkey Bay (MV Chilembwe reparation – September 2016)

10.4 **Benefits of interventions**

Forecast freight movements resulting from some of the interventions above are listed in Table 10.1. Cost implications are shown in Table 10.2.

Table 10.1 Forecast annual freight tonnage on selected routes, 2036

Route	Tonnes
Shire Zambezi	1,623,000
Nkhata Bay-Mbamba Bay	72,000
Chilumba-Chipoka-Monkey Bay	35,000
Chilumba-Liwonde	64,000

Table 10.2 Major intervention costs

Route	Major works	Capital cost ($M)	Annual operating costs ($M)
Shire Zambezi	Dredging	18	30
	Ports	Not known	
	Vessels	Not known	Not known
Nkhata Bay-Mbamba Bay	Ports	20	
	Vessels	2.5	Low
Chilumba-Chipoka-Monkey Bay	Ports	10	
	Vessels	2.5	Medium
Chilumba-Liwonde	Ports	15	
	Vessels	2.5	Medium

The benefits of the proposed interventions are scored in Table 10.3. The proposal to develop Nkhata Bay port on the Mtwara Corridor is ranked first, with the Shire Zambezi waterway second.

Table 10.3 Benefits of proposed interventions

Route	Traffic	Operating cost	Environmental	Strategic	Score	Rank
Shire Zambezi	Very High	High, may need subsidy	Unknown, thought to have significant impact by Government of Mozambique	Alternative to Beira port, but reliant on Beria for transfer		
	5	0	1	3	9	2
Nkhata Bay-Mbamba Bay	Low	Low	Limited	Mtwara is strategic alternative to Mozambiquan ports		
	1	3	3	4	11	1
Chilumba-Chipoka-Monkey Bay	Very Low	Medium	Limited	Traffic would use Nacala port		
	0	1	3	3	7	3
Chilumba-Liwonde	Low	Medium, dredging may be needed	Needs investigation	Traffic would use Nacala port		
	1	1	2	3	7	3

The proposed wet port at Liwonde requires a detailed feasibility study, and it is recommended that this an early action in the Action plan for the sub-sector. As recommended earlier, a dry port at Liwonde is not the most favourable location, and the proposal is dropped in favour dry ports in Blantyre and Lilongwe.

The proposed Shire Zambezi Waterway project should not be overlooked. It offers the biggest potential in terms of freight traffic transfer to inland water transport. Dredging costs need to be verified, along with the environmental impacts of dumping dredged material.

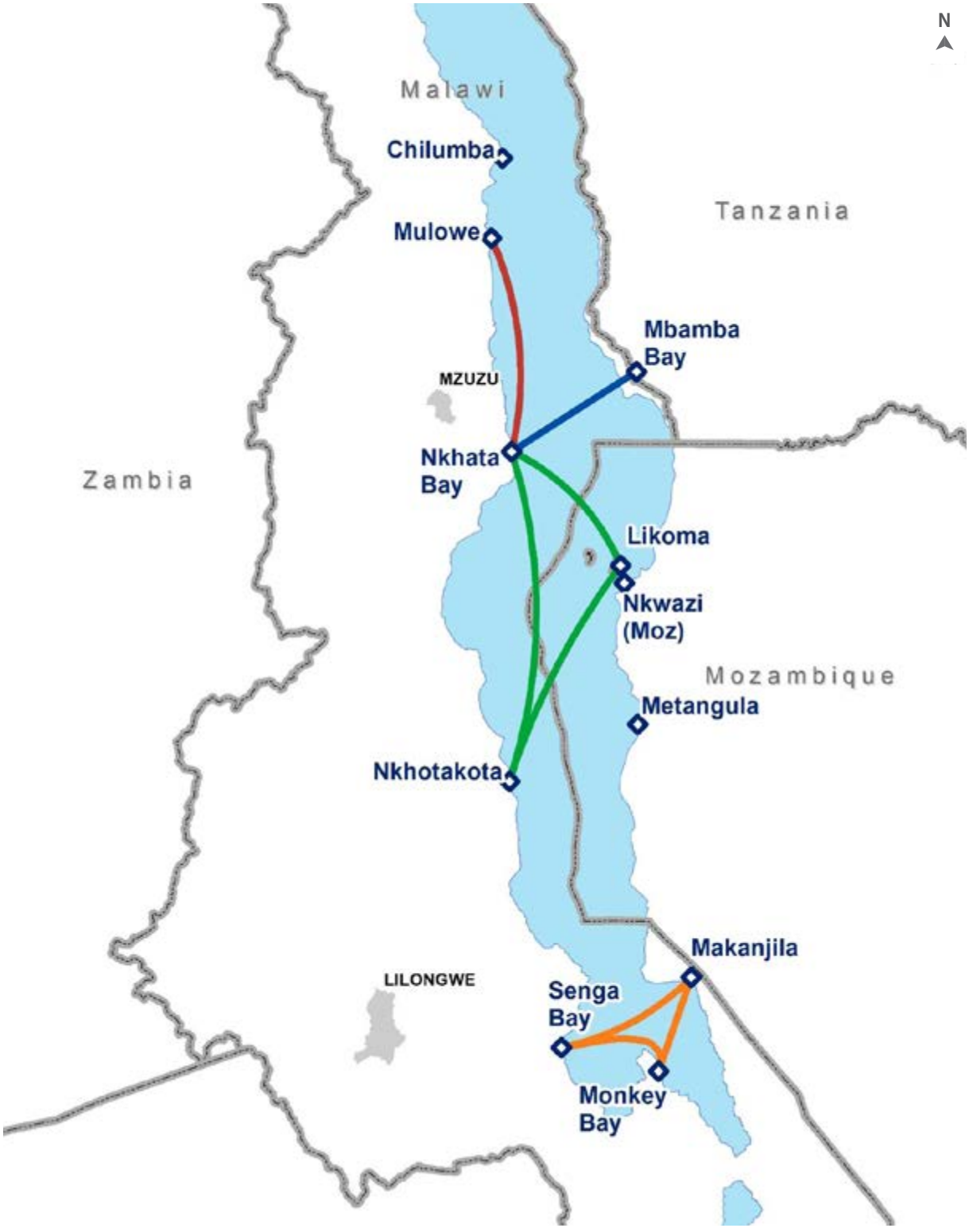
10.5 **Passenger strategy**

The only established routes are for the passenger operation as described in chapter 3. These routes are not always economically viable due to low passenger demand and lack of suitable berthing facilities at the stopping points. The passenger service needs to be split between the north and south of the lake to meet passenger needs efficiently. A passenger demand analysis with pricing strategy should be developed to establish the preferred routes and required size of vessels. The current fleet of passenger vessels should then be gradually replaced.

It is recommended that the ferry operation is developed as follows, and as indicated in Figure 10.10.

- Central route with a regular service between Nkhata Bay, Likoma Islands and Nkhotakota Bay - ferry capacity to be 100 to 200 passengers. With a business plan to determine if a smaller vessel with daily trip would be more appropriate;
- South route with regular service between Monkey Bay, Makanjila and Senga Bay - ferry capacity to be 50 passengers;
- North route with service between Nkhata Bay and Mulowe – ferry capacity to be 50 passengers; and
- International route to Mbamba Bay (Tanzania) with Ro-Ro traffic.

Figure 10.10 Potential passenger operation network



Legend

- Regular Central Service
- Regular link to Tanzania (Ro-Ro)
- Regular Northern Service
- Regular Southern Service

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10.6 **Freight strategy**

The historical freight operation route in the 1980s and 1990s was the Chilumba/Chipoka route on the Dar es Salaam corridor. Now that most of the freight transits via Mozambique or South Africa ports, there are no longer any established freight routes. The focus should be to establish 2 'main' ports in the North and South, connected to the Mtwara corridor and Nacala corridor. Nkhata Bay in the north, is ideally located on the Mtwara corridor for ro-ro service and connection to road networks between Tanzania and Zambia. Chipoka port is connected to the rail network and its existing infrastructure would make it a suitable candidate. However, the low lake water levels have made the port non-operational and important capital investment would be required for revival of the port. As an alternative, a more centrally located port could be developed on the Shire River at Liwonde as it is directly connected to the railway network and Nacala corridor. This would also require important capital investment. It would be preferable to establish one of these 2 locations as the preferred main port in the southern lake region. However, both ports can be developed simultaneously should the future freight demand support it. Those main ports should be supported by a network of smaller ports or landing facilities for freight movement and distribution across the lake.

It is recommended that the freight operation is developed as listed below and shown in Figure 10.11:

- Main freight routes:
  - Nkhata Bay and Mbamba Bay as part of the Mtwara corridor (Ro-Ro service);
  - Nkhata Bay and Chipoka or/and Liwonde as part of the Nacala corridor. These two options require a detailed feasibility study.
- Secondary freight routes:
  - Nkhata Bay to Chilumba;
  - Nkhata Bay to Likoma;
  - Chilumba to Chipoka or/and Liwonde;
  - Itunga port to Chipoka for dedicated movement of cement/clinker, and;
  - Nkhotakota to Chipoka or/and Liwonde for dedicated movement of sugar.

Figure 10.11 Potential freight movement using IWT

Legend

- Main freight route
- Secondary freight route
- Land-based freight route

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Quay wall at Chipoka port

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Malawi National Transport Master Plan

11 Implications of an oil industry

Inland Water Transport Sub-Sectoral Plan

11 **Implications of an oil industry**

11.1 **Background**

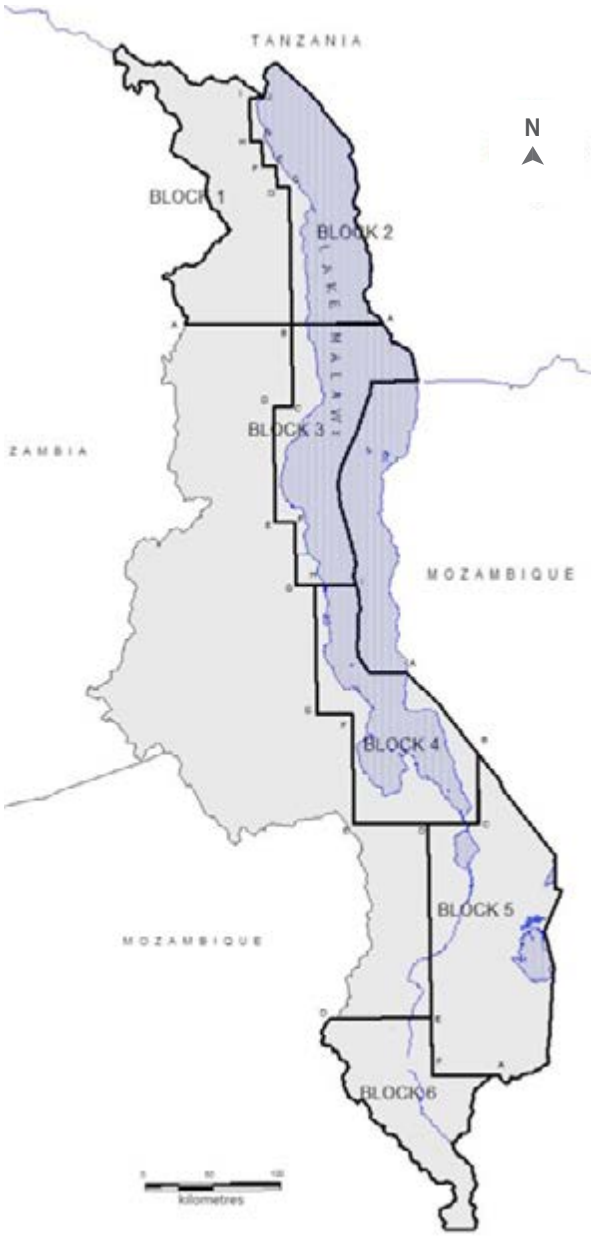
The oil industry could become one of the most important sectors of the Malawian economy. The successful exploitation of oil reserves depends on the successful and timely construction of the infrastructure required to access, process and transfer the oil.

This will involve construction on a scale not yet witnessed in Malawi, and the need to bring huge volumes of equipment and materials to the various wells and facilities along the whole length of Lake Malawi, as well as to the extreme north and south of the country. These movements will require a significant upgrade of transport infrastructure.

Malawi's oil reserves are not proven. However, there is considerable optimism given the similarities in geological conditions with other areas in the Rift Valley, such as the Albertine Grabben region of Uganda, where reserves of 3.4 billion barrels of oil have been validated.

Malawi has been divided into 6 blocks for the purposes of exploration and production as shown in Figure 11.1.

Figure 11.1 Oil exploration blocks



Source: Mining in Malawi, February 2016

The status of each block is shown in Table 11.1.

Table 11.1 Malawi oil blocks' status

Block No.	Overview	Status
1	▪ Operator: SacOil Limited ▪ Group company holding interest: SacOil – 100% ▪ 12,265 km², Block 1 is the second block demarcated for oil exploration	▪ Exploration stage. Exploration licence divided into an initial 4 year period and 2 subsequent 3 year renewal periods. Initial period 2012 to 2016
2 3	▪ Operator: Surestream Petroleum ▪ Holding interesting: 51% stake held by HAMRA	▪ Presidential order on ban of exploration on blocks lifted
4 5	▪ Operator: RAK Gas MB45 Limited ▪ Group company holding interest: Ras al-Khaima – 100% ▪ Block 5 is the largest block demarcated for oil exploration	▪ Presidential order on ban of exploration on blocks lifted ▪ PSA signed in 2014 is being re-negotiated to address several anomalies noted by GoM ▪ Exploration license has expired and is to be re-newed
6	▪ Operator: Pacific Oil Limited ▪ Group company holding interest: Unknown	▪ Presidential order on ban of exploration on blocks 2 to 6 lifted ▪ Exploration work to continue following lifting of government suspension, though exploration license has expired and is to be re-newed ▪ PSA signed in 2014 is being re-negotiated to address several anomalies noted by GoM

11.2 Transport for oil industry development

Even at exploration stage, heavy plant and equipment will need to be imported into Malawi to the coastal areas, and possibly on the lake. Modes of transport determined for this could set the tone for future import of the much larger volumes required for production.

During construction of the Central Processing Facilities (CPFs) transport will be needed to bring materials in and also for the construction of warehouses and camps that will be based some distance from the CPF area. Truck volumes will correspond to the size of the CPF, which is determined by the size of the separators used to process the hydrocarbons. The construction of the CPF will require out-of-gauge transport – a container/flat rack that can be handled by a rigid ISO over-height spreader attached to a standard Quay Crane spreader and requiring no manual intervention at the point of stow. Alongside the movement of materials, a large number of workers will be required on site. The peak period of high traffic volumes could last for 4 to 5 years and decline significantly thereafter.

Table 11.2 indicates recommended options for the import of rigs and other specialised equipment needed to support an oil industry in Malawi.

Drilling exploration is not expected to occur before 2020, and it is possible that production could start some years after that, but all within the timeframe of the NTMP.

The initial volumes noted above appear quite small to justify the required investment. Nevertheless, if IWT and rail are to be used regardless of the volumes there are several transport segments to consider:

- Transport from 'offshore' production to the shore for storage/transhipment (Blocks 2, 3 and 4). This will be typically done by ships or submarine pipelines; and
- Transport link using IWT/ rail or pipelines for distribution or export.

In avoiding the use of trucks, production from the north part of the country will require consequent investment for transport connections. Offshore production from Block 4 can be linked directly to the rail network at Chipoka. One of the key issues with transporting the crude oil using the lake is the availability of vessels. Several tankers and a new shipyard to assemble the vessels would be required. An example of a tanker for IWT is shown in Figure 11.2. This has a capacity of 800m^3 as it may be difficult to get larger ships in due to draft limitations around the lake. Depending on the distance to travel, it might take 4 days for a ship to load, travel, unload and return so it would need 3 or 4 of these kinds of vessels to meet the 255,000 CuM per year.

There is also a need for offshore supply vessels (Figure 11.3) and terminals. Because of the limited offshore storage capacity, fuel, supplies, materials and equipment need to be shipped frequently in relatively small quantities to the offshore sites. On return journeys, waste materials, equipment no longer needed and equipment in need of repair and maintenance is shipped back to shore. Crews will also be moved by vessels. There is also a large requirement for supporting activities/industries, which would typically be located at the offshore supply terminals.

Table 11.2 Proposed logistics for oil equipment import

Block No.	Main districts	Logistics plan
1	Chitipa, Karonga	Option 1: Rail from Nacala, transship at Liwonde using IWT to Chilumba Option 2: Dar es Salaam, via Mbeya and new rail link to Karonga
2	Lake Malawi	Option 1: Rail from Nacala, transship at Liwonde using IWT to Chilumba Option 2: Dar es Salaam, via Mbeya and new rail link to Karonga
3	Lake Malawi	Option 1: Rail from Nacala, transship at Liwonde using IWT to Nkatabay Option 2: Dar es Salaam, via Mbeya and new rail link to Chilumba, tranship to IWT to Nkhata Bay
4	Lake Malawi	Option 1: Rail from Nacala, transship at Liwonde using IWT to Chipoka Option 2: Rail from Nacala, transship at Liwonde to road
5	Phalombe, Mulanje, Machinga, Chiradzulu	Option 1: Rail from Nacala, transship at Liwonde to road Option 2: Rail from Nacala, transship at Limbe to road
6	Nsanje, Chikwakwa	Option 1: Rail from Nacala, transship at Limbe to road Option 2: Rail from Beira, new line to Nsanje/Bangula, transfer to road

Figure 11.2 Tanker vessel

Figure 11.3 Offshore supply vessel

11.3 **Transport for oil production**

The most efficient and environmentally sustainable means of moving crude or refined oil is by pipeline. However, a pipeline would only be viable for volumes of 25,000 to 40,000 barrels per day. Any given block with a lower production rate than the threshold for a pipeline would use other forms of transport, an in such a case, rail and IWT should be prioritised.

The situation is complicated by the option of a potential refinery in Malawi that could meet domestic needs, and possibly some regional (primarily Zambian) needs too. A refinery would be viable at a minimum processing of 25,000 barrels per day, somewhat less than Malawi's equivalent current fuel consumption. Modular refineries are possible under which capacity can increased by 2 or 3 times as need arises. A decision on a location for a potential refinery would need to take into account the production rates (if any) of the various blocks and sub-blocks within them. However, at this early stage it is recommend that any refinery is located as close as possible to the railway, in order that domestic distribution can be done by rail and not road, particularly to the main centres of demand in Blantyre and Lilongwe.

In the absence of a refinery, crude oil should be exported via pipeline to an appropriate port.

In the absence of a pipeline, or perhaps before a pipeline is constructed, crude oil should be exported by rail to Nacala. A production rate of 5,000 barrels per day would be the equivalent of around 255,000 tonnes per year, a viable load for rail transport. Consideration would need to be given to the options of any rail extensions versus local pipelines to find the most economic means of transport to the trunk rail line.

There is some scope for IWT to play a role in transporting crude oil, since the most likely oil deposits are on the coastal strip or in Lake Malawi. The current tanker vessel MV Ufulu has been out of service for 15 years and has a carrying capacity of 310 tonnes, well below what be required to service all of 5,000 barrels per day. Significant investment in port infrastructure and vessels would be required.

MV Illala at Chipoka Port

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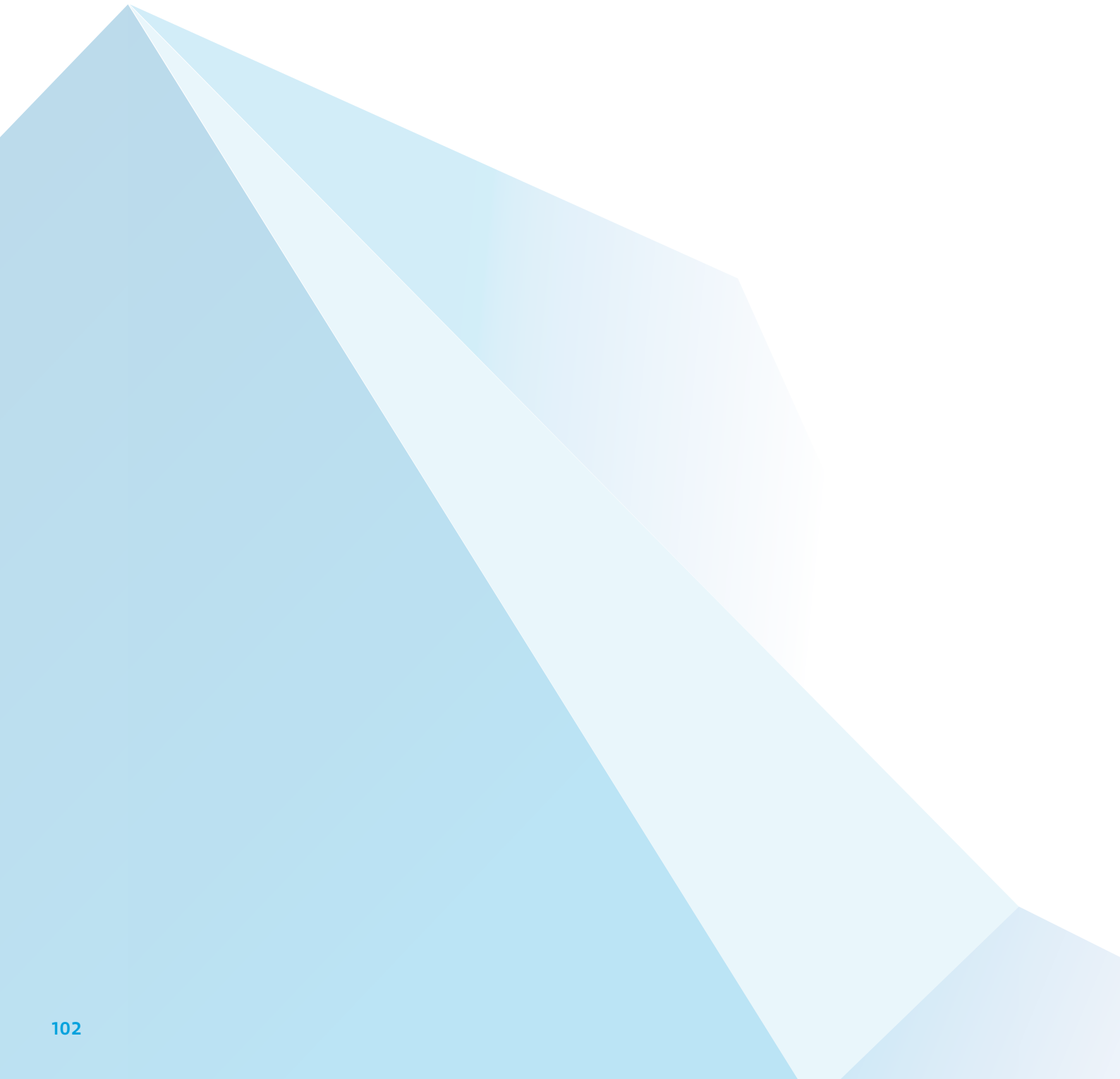
Malawi National Transport Master Plan

12 Climate change mitigation measures

Inland Water Transport Sub-Sectoral Plan



12 **Climate change mitigation measures**

12.1 **IMO regulations**

The International Maritime Organization (IMO) is currently addressing GHG emissions from international shipping through regulatory work supported by capacity-building initiatives. IMO has adopted regulations to address the emission of air pollutants from ships and has adopted mandatory energy-efficiency measures to reduce emissions of greenhouse gases from international shipping, under Annex VI of IMO's pollution prevention treaty (MARPOL)[8] . IMO is also engaging in global capacity-building projects to support the implementation of those regulations and encourage innovation and technology transfer.

Malawi is a member of IMO since 1989 and as such IWT services are to meet international regulations for the shipping of cargo and passengers. The international energy efficiency measures are legally binding and apply to all countries. The Energy Efficiency Design Index (EEDI) was made mandatory for new ships and the Ship Energy Efficiency Management Plan (SEEMP) for all existing ships.

IMO has established a series of baselines for the amount of fuel each type of ship burns for a certain cargo capacity. Ships built in the future will have to beat that baseline by a set amount. By 2025, all new ships are intended to be 30% more energy efficient than those built in 2014. Under the energy-efficiency regulations, existing ships now have to have an energy efficiency management plan in place.

IMO is promoting the Global Maritime Energy Efficiency Partnership (GloMEEP[9]) project which aims to build understanding and knowledge of technical and operational energy-efficiency measures to lead maritime transport into a low-carbon future. Funded by the European Union and implemented by the IMO, the Global MTTC (Maritime Technologies Cooperation Centres) Network initiative unites technology centres in targeted regions into a global network. Together, they are promoting technologies and operations to improve energy efficiency in the maritime sector and help navigate shipping into a low-carbon future[10].

12.2 **Vessel design**

The top three energy losses for ships have been identified as follows:

- Hull resistance occasioned by natural environmental conditions such as tides, waves and wind, hull resistance and friction, wave-making and air resistance.
- Propeller losses such as frictional loss and rotational loss.
- Engine heat loss such as heat, exhaust and transmission loss

The above energy losses are compensated by higher fuel consumption. Research and development on improved technology is currently being carried out to reduce fuel consumption and carbon emissions. The most commonly used methods and some of the latest technologies are listed below.

12.2.1 Hull form optimisation

The shape of the ship's hull has an important role in the overall performance and efficiency of ships. Optimization of the hydrodynamic performance of a vessel's hull form can achieve the least required power. Hull design efficiency has constantly evolved to reflect oil market conditions. Fuel price and freight rates have been major drivers of fuel efficiency over time. With the new mandatory EEDI being enforced for new ships, current hull designs can be

[8] *http://www.imo.org/en/OurWork/environment/pollutionprevention/airpollution/pages/air-pollution.aspx*
[9] *http://glomeep.imo.org/*
[10] *MTCC-Africa: Jomo Kenyatta University of Agriculture and Technology (JKUAT), Kenya*

improved greatly with Computational Fluid Mechanics (CFD) models to achieve optimal fuel efficiency.

12.2.2 Skin friction reduction

Skin friction reduction can effectively improve fuel efficiency. Air lubrification technology is aimed at reducing resistance between the hull and seawater by distributing air bubbles under the ship. The system can be retrofitted to existing ships. Hull surface texturing technology is also being developed.

12.2.3 Energy-saving device and propeller efficiency optimisation

As for the hull form optimisation, propeller design and use of energy-saving devices can improve fuel efficiency of ships. Research has been carried out on propulsion improving devices such as pre-swirl devices, post-swirl devices and high-efficiency propellers. These systems can be integrated to the design of new ships or retrofitted to existing ships.

12.2.4 Ship structural optimisation

Lighter vessels require less power for propulsion and are more fuel efficient. This is often the case in the design of fast ferries and high speed craft. Structural weight reduction can be achieved by introducing nonferrous materials or by using higher strength steel. The use of FRP laminates or aluminium can effectively reduce the ship's deadweight and reduce fuel consumption. However, material cost can be high compared to steel and there are some concerns with fire safety and material recycling.

12.3 **Alternative fuels**

Commercial vessels traditionally use heavy fuel oil (HFO) which is a by-product of refined fuel. IMO regulations aim at reducing air pollutants from shipping, particularly sulphur oxide (SOx) and nitrogen oxide (NOx), which are contained in HFO and emitted from ships. Alternative forms of fuel are currently being studied such as bio-fuel and LNG. However, these present some operating challenges such as fuel system compatibility, long term storage and biological contamination for bio-fuel and on board storage, supply and crew qualifications for LNG.

Fuel Oil Emulsion technology which burns more completely than unmodified fuel and so uses less fuel, emissions are lower and the engines run cooler and so should require less maintenance is currently being tested.

Cold ironing which is the process of providing shore-side electrical power to the ship when at the port is also a mean of reducing emission as it allows to run auxiliary equipment while the main and auxiliary engines are turned off. However, cold ironing requires large infrastructure investment.

The utilization of renewable energy sources is also currently being tested for the shipping industry. Most of the focus has been on wind power which has been the natural energy historically used in shipping. The various technologies being currently studied include towing kites, Turbosails, rotor sails, Flettner rotors and windmills. However, the technology currently available is not advanced enough to be widely used. Solar panels are also being considered as an alternate source for energy for the generation of auxiliary power.

12.4 **Improved fuel efficiency**

Regular vessel maintenance is recommended to improve fuel efficiency. The propeller and underwater parts of the hull require regular cleaning to remove fouling organisms which increase roughness and frictions. A ship system management should also be put in place to monitor energy efficiency of machinery and equipment.

Voyage planning and ship operation can improve fuel efficiency. The speed of a vessel will have a large impact on fuel consumption. It is therefore recommended to carefully consider vessel schedule and required optimum speed for fuel efficiency. There are also other voyage planning improvement methods which can improve fuel consumption such as optimisation of the draft at which the vessel is sailing, autopilot improvements and weather routing.

Chilumba Port

ATKINS

Malawi National Transport Master Plan

13 Proposals for legal, regulatory and institutional reform

Inland Water Transport Sub-Sectoral Plan

13 Proposals for legal, regulatory and institutional reform

13.1 Introduction

It is important that the planning, construction, operation and management of inland water shipping and ports in Malawi is undertaken through a strong, transparent and up-to-date legal and regulatory framework by institutions with the structure, capacity and skills to discharge the required functions effectively and efficiently. On both counts, as with other sub-sectors, Malawi's current arrangements exhibit key challenges.

These are examined in this Chapter, together with the Government's currently proposed reforms and recommendations to improve overall maritime governance in combination with other sub-sectors.

These recommendations reflect the analysis set out in the Institutional Reform Plan and Regulatory Reform Plan which have been prepared under the NTMP.

13.2 Review of the existing legal framework

The Inland Waters Shipping Act [Cap. 71:01, Laws of Malawi] (IWSA), which was enacted in 1971 and substantially revised in 1995, provides for, amongst other things, the survey, registration, licensing and safety of all vessels operating on the inland waters of Malawi; for the safety of passengers and cargo; and for the competency of masters and crews operating vessels on the inland waters of Malawi. Under the Declaration of Inland Waters Regulations [G.N. 12/1970], the Minister responsible for Transport declared Lake Malawi, Lake Malombe, Lake Chilwa, Upper Shire River and Lower Shire River as the inland waters of Malawi.

The IWSA only relates to the regulation of vessels and shipping services on the inland waters of Malawi and does not extend to the regulation of Malawi ports. The IWSA also does not provide a facilitative environment for the management and operations of shipping services or ports under PPP arrangements, such as the current concessions. In terms of section 3 of the IWSA, the IWSA has extra-territorial application on all Malawi vessels as the Act is applicable to all Malawi vessels regardless of where they are situated whether within or outside the inland waters of Malawi.

Part II of the IWSA provides for the surveying and registration by the Chief Surveyor, under the DMS, of all vessels operating on the inland waters of Malawi. Section 10 makes the surveying of any Malawi vessel or any other vessel on the inland waters of Malawi to be subjected to the IWSA. This means that where there is a conflict between any provision of the IWSA and any other provision of an international treaty or convention, the provision of the IWSA would rank paramount. Every operator of a vessel, whether a natural person or a juristic person, is required to apply for surveying and registration of its vessel(s) with the Chief Surveyor. Upon successful surveying and compliance with the prescribed requirements, the operator is issued with a Certificate of Registration by the Chief Surveyor for such period as prescribed.

As already noted in this Plan, shipping services on Lake Malawi has been concessioned to MSC (operated by Mota Engil), to run the concession for a period of 35 years. Although the current legal framework under the IWSA does not hinder the granting of concessions and private sector participation in the operation of vessels and provision of shipping services, there is a need to reform the IWSA so that it is proactive in promoting participation of other shipping services providers in the inland waters of Malawi. Such legislative reform would align the IWSA with Statement 3.2.4 of the National Transport Policy which calls for competition

and the promotion of increased private sector participation and investment in the provision of safe and efficient shipping services.

The IWSA does not contain express provisions regulating ports. In terms of the legislative framework, there is a gap in the IWSA in terms of regulation of ports. Insofar as the Minister responsible for Transport has designated under the Inland Waters Shipping (Designation of Areas as Harbours) Notice [G.N. 178/172] Monkey Bay, Chipoka, Chilumba and Nkhata Bay as the four ports of Malawi, the IWSA does not contain the regulatory framework for the ports. There was a draft bill, Malawi National Ports Authority Bill of 2007 (the 2007 Bill), which was expected to regulate the technical operations of all ports of Malawi. The 2007 Bill would have regulated the ownership, management, control and operation of all ports of Malawi. This has been dropped in favour of the technical operation of the ports being regulated by the Department of Marine Services (DMS).

The other gap with the IWSA is that it does not provide for the procurement or delivery of port services in Malawi. With the enactment of the PPP Act in 2011, regulation of procurement and delivery of port services under a PPP arrangement is now governed under the PPP Act. The PPP Act provides for the procurement and delivery of all infrastructure services in Malawi, including ports. Section 8 of the PPP Act mandates the PPPC to regulate the procurement and delivery of all the infrastructure services in Malawi. Pursuant to the PPP Act, the Public Private Partnership Commission (PPPC) concessioned the management and operations of all the four ports of Malawi under a 35 year concession to a special-purpose vehicle, MPC as the concessionaire, to manage and operate the concession. MPC is also operated by Mota Engil.

The concessioning of the ports has necessitated a review of the functions of the DMS, including the missing but important regulatory function. Review and, if appropriate, transfer of the regulatory function of the DMS under the IWSA should give an opportunity to align the IWSA with the National Transport Policy and International Maritime Conventions. Statement 3.1.4 of the National Transport Policy calls for improving the institutional capacity of DMS. On the other hand, Statement 3.2.4 of the National Transport Policy calls for the promotion of increased private sector participation and investment in the provision of safe and efficient port services. The institutional capacity of the DMS in relation to undertaking regulatory functions is not provided for under the IWSA. In practice, in the absence of any regulatory framework, the PPPC regulates all contractual issues, the DMS regulates all the technical issues and MoTPW's Planning Department regulates all commercial and financial issues relating to the MSC concession. The ISWA gives authority to the DMS to regulate inland waters transport.

Part IV of the IWSA provides for the licensing of vessels operating on the inland waters of Malawi by the licensing authority, i.e. the Chief Surveyor. Upon successful surveying and compliance with the prescribed requirements, a vessel is issued with a licence which is valid for a period of one year. A valid licence is required to be conspicuously displayed on board each vessel.

Part V of the IWSA empowers the Minister responsible for Transport to enter into bilateral and multilateral arrangements with the Government of any other country which borders on any inland waters of Malawi. Section 43 of the IWSA mandates the Minister to enter into agreement with a government of another country which borders on any inland waters of Malawi for, amongst others, access and use on the inland waters of vessels, including commercial vessels, registered in such other country. Section 43 is important as it helps to address the issue of cabotage (i.e. the transportation of passengers and/or cargo between two points in the same country by a vessels registered in another country). The effect of section 43 is to progressively remove restrictions against vessels of neighbouring countries operating on the bordering inland waters of Malawi. Section 43 is relevant to Article 8.2.2 of the SADC Protocol on Transport, Communications and Meteorology as Article 8.2.2 allows and promotes Member States to progressively remove restrictions on cabotage by ships registered in a different Member State. If any amendment was to be made to section 43 of the IWSA, it is recommended that the amendment should provide for the Government of Malawi affirming its intention or position to permit cabotage by ships registered in countries bordering the inland waters of Malawi.

Since the provisions of the IWSA rank paramount to all other domestic and international provisions regulating vessels on the inland waters of Malawi, section 44 under Part V of the IWSA gives the Minister discretion, by order published in the Gazette, to suspend the operation of any provision of the IWSA where it is in conflict with any other obligation of the Government of Malawi under a treaty, convention or agreement entered into with another country. Subject to the Minister promulgating in writing in the Gazette, any provision of the IWSA would rank supreme notwithstanding that the Government of Malawi is committed to some international obligations. Section 44 provides anomaly in the IWSA that has to be repealed if not to render Malawi's international obligation inoperative. Nonetheless, repeal or amendment of section 44 does not fully address the legislative hurdle as international conventions to which Malawi is a party have no direct effect within Malawi at the stage when they are signed if they are not domesticated in Malawi through an Act of Parliament. In terms of section 211 of the Constitution, any international convention signed by Malawi cannot form part of the domestic law if it is not provided for under an Act of Parliament. This constitutional hurdle will not be discussed further for review and recommendation under this Review as it is beyond the scope of this Review.

Part VI of the IWSA provides for surveys and inspections of vessels operating on the inland waters of Malawi by the Chief Surveyor. Every vessel is subjected to various inspections on a yearly basis depending on the nature of activities, whether a vessel is a passenger, cargo or multi-functional. Upon successful inspection, the vessel is issued with an Inspection Vessel. If the vessel has complied with all the prescribed requirements, the vessel is issued with a Safety Certificate. An Inspection Certificate and a Safety Certificate are required to be conspicuously displayed on the board of every vessel. It is important to note that surveys and inspections under Part VI of the IWSA are required to be undertaken pursuant to applicable international Convention on Safety or Tonnage to which Malawi is a party. Apart from the IWSA making reference to the International Maritime Dangerous Goods Code (IMDG Code), it is not clear under domestic law which other convention of the International Maritime Organisations (IMO) Malawi is party to.

Part VII of the IWSA provides for the registration, certification and licensing of all persons manning vessels operating on the inland waters of Malawi by the Chief Surveyor. The Certificates of Competency are graded in different levels depending on the qualifications and competencies gained in operating the vessels. Upon successful examination of every applicant, the applicant is issued with a Certificate of Competency by the Chief Surveyor for such period as prescribed.

Part VIII of the IWSA provides for the surveying and certification by the Chief Surveyor of load line vessels. Upon successful surveying, a load line vessel is issued with a Load Line Certificate for such period as prescribed. A Load Line Certificate is required to conspicuously display on board of each vessel.

It is clear that operation of any vessel on the inland waters of Malawi is subject to various regulations and requirements under the IWSA. The aim of the various regulations and requirements is to promote the safety of the vessels and of the passengers and cargo being ferried on the vessels. Private sector participation in services related to the inland waters of Malawi is therefore subjected to the provisions of the IWSA.

In as much as the legal and regulatory frameworks for the inland water and shipping services in Malawi need to be enhanced, there are many strong provisions which remain relevant for regulating the sub-sector, especially on the grounds of safety. It is likely that the challenge with this sub-sector remains enforcement of its regulations. Some of the regulations that remain relevant for regulating the sub-sector notwithstanding its weak institutional structure are:

- Part II of the Inland Waters Shipping Act requires every vessel intending to, or operating, on the inland waters of Malawi to obtain a Certificate of Registration issued by the Chief Surveyor for such period as prescribed;
- Part IV of the Inland Waters Shipping Act requires every vessel intending to, or operating, on the inland waters of Malawi to obtain a Licence issued by the Chief Surveyor for a period of year, renewable on expiry;
- Part VI of the Inland Waters Shipping Act requires every vessel operating on the inland waters of Malawi to be inspected by the Chief Surveyor on a yearly basis and obtain an annual Inspection Certificate issued by the Chief Surveyor for a period of one year;
- Part VI of the Inland Waters Shipping Act requires every vessel operating on the inland waters of Malawi to be inspected by the Chief Surveyor on a yearly basis and obtain an annual Safety Certificate issued by the Chief Surveyor for a period of one year;
- Part VII of the Inland Waters Shipping Act requires every person manning a vessel intending to, or operating, on the inland waters of Malawi to obtain an appropriate Certificate of Competence issued by the Chief Surveyor for such period as prescribed; and
- Part VIII of the Inland Waters Shipping Act requires every load line vessel intending to, or operating, on the inland waters of Malawi to obtain a Load Line Certificate issued by the Chief Surveyor for such period as prescribed.

Nevertheless, given the age of the current legislation, its mismatch with the current policy of concessioning of lake services and port operations, and the need to align, comply and enforce modern regulations such as those issued by the IMO, there is a clear case for a fundamental review, drafting and adoption of a new legal and regulatory framework. This has already been proposed by MoTPW and is discussed further below.

13.3 **Review of current institutional arrangements**

The Department of Marine Services sits within the Ministry of Transport and Public Works. Its mandate is to create a sustainable infrastructure and provide services for a safe, efficient and economic water transport for the benefit of the public, operators and the economy.

The DMS is responsible for administering regulatory provisions governing Maritime Safety, Maritime Education and Training, Port Management and Operations and Maritime Pollution Control. Historically, it has also been responsible for policy setting and certain operational functions, and to some extent its structure and manpower still reflects this role. The current arrangements, including regarding compliance monitoring and enforcement, and effective management of the lake services and port operations concessions is generally regarded as not fit for purpose and the need for reform has been accepted, both in its own terms and in line with the Government's broader agenda for institutional and regulatory change.

Institutional proposals for the maritime sector have varied over time with plans for a National Ports Authority giving way to a more broadly based Inland Waterway Authority, subject to issues of funding and cost. However, none of these have been taken forward and the current approach, set out in the National Transport Policy, is to strengthen the capacity of DMS itself to take on the regulatory role.

The 201 IMC Report, which reviews the 1995 Inland Waters Shipping Act, notes a number of institutional issues associated with the current and proposed future arrangements. These include:

- Significant weaknesses in the capacity of DMS to provide services such as publication of applicable standards, navigational information, information on licensed operators, fees and tariffs, and a lack of engagement with operators, compounded by the Department being based in Lilongwe and having no local lakeside office;
- Ambiguity in the legally defined role of the DMS in advising and supporting the PPPC in monitoring port and inland water service concessions;
- An apparent conflict between the draft 2007 legislation establishing a National Ports Authority with the PPP Act and the powers of the PPPC in letting concessions, as well as duplicated jurisdiction between the Ports Authority in regulating within port limits and DMS for lake and waterways outside ports; and
- Outdated legal provisions which do not explicitly reference the key IMO conventions and which result in key issues, such as safety, pollution, salvage and seafarer training not being properly regulated.

With the proposed Port Authority squeezed on the one hand by the PPP Commission in letting and managing port concessions, and the DMS on the other in regulating inland waters outside of port limits, the Report recommends that the proposal be abandoned in favour of creating a single regulator for all inland waters and ports. This should be in the form of an Inland Waterways Authority, created as a separate corporate entity or, if issues of funding and cost make this challenging, vesting the equivalent duties/powers in DMS for the time-being.

13.4 **Proposals for regulatory reform**

Recently in 2016, a draft Inland Waters Shipping Bill has been developed, which will repeal the existing Inland Waters Shipping Act, when enacted. The Draft Inland Waters Shipping Bill takes a holistic approach to address many areas relating to the inland waters shipping sub-sector, including making provision for: the survey, registration, licensing and safety and security of all vessels used on inland waters of Malawi; the safety and security of passengers and cargo, for the competency of masters and crews; the monitoring of any agreement, permit or authorization of any kind relating to and for the regulation of the shipping and the operation of ports and ports facilities. The scope of the Bill extends to covering the inland water services under PPP and other concession arrangements.

The Inland Waters Shipping Bill comprises 18 parts, summarised as follows:

- Part I of the Bill contains preliminary provisions. Clause 1 of the Bill provides the short title and makes provision in respect of the commencement of the legislation. Clause 2 is the interpretation clause. Part I is standard in terms of legislation drafting in Malawi. It would be more appropriate for the Bill to make a general reference of and adopt the definitions in PPP Act instead of attempting to define each technical term, such as 'concession' or 'concessionaire' according to the PPP Act. Clause 3 provides for the scope of application of the Bill, which is limited to: (i) Malawi vessels regardless of where they are located; (ii) all foreign vessels in the inland waters of Malawi; and (iii) all Malawi ports, port facilities and operations. Clause 4 gives the MoTPW powers to designate harbours or ports in the inland waters of Malawi.
- Part II of the Inland Waters Bill, particularly Clause 5, gives the MoTPW Minister powers to administer the Act. Clause 6 mandates the Minister to appoint administration officers to regulate the inland waters shipping transport sub-sector in Malawi. This means that the Bill retains almost the status quo of a unit, the Department of Marines, as it does not establish an independent body to be responsible for the regulation of this sector. Clause 7 provides the general functions and powers respectively of the Administration as the regulator of inland waters shipping transport sub-sector in Malawi. Some of the functions and/or powers would be best to be provided under regulations instead of the main Act. This would avoid overcrowding the Act with numerous provisions. Also, the regulations would enable flexibility and facilitate ease of amending the provisions on a need basis. Clause 10 introduces a 'concept of good faith' as a standard of determining how a public officer has conducted affairs as a regulator. This is a very high standard that could pose a lot of challenges to be achieved. It is suggested that a lower standard, which is attainable, such as 'concept of negligence or negligent behaviour' replace the 'concept of good faith.
- Part III of the Bill provides for bilateral arrangements and saves existing treaty obligations with other countries. Part III is important as it promotes the rule of law and international law which is important for operation and development of the inland waters shipping transport sub-sector.
- Part IV of the Bill provides for the registration of the vessels operating on the inland waters of Malawi, including application, obligations, registration and marking of vessels, renewals, naming and change of name, tonnage and re-registration of vessels.
- Part V of the Bill provides the surveyor with general powers to survey and inspect any vessels on the inland waters of Malawi, including duties of vessel operators to provide information to the surveyor, power of surveyors, surveys, inspections and certificates of seaworthiness.
- Part VI of the Bill provides for licence and licensing authority, licensing of vessels, using vessels in contravention of Clause 72 of the Bill, duration of licence, prohibition to transfer a licence, form of licence, procedure for application for licence, objection to application for licence, discretion of the licensing authority to grant or refuse licences, condition of licences, insurance, power to revoke or suspend licences and provision for appeals in connection with licence.

- Part VII of the Bill provides for proprietary interests, transfer and mortgages of vessels on the inland waters of Malawi.
- Part VIII of the Bill requires declaration of the national character on any vessel on the inland waters.
- Part IX of the Bill deals with manning, qualifications and training of crew members of vessels.
- Part X of the Bill provides for general requirements for safety, load lines and aids to navigation.
- Part XI of the Bill empowers the MoTPW Minister to make regulations for the conditions of service of crew members, including working conditions and work complaints procedure.
- Part XII of the Bill empowers the MoTPW Minister to make regulations in respect of accommodation, facilities and provisions on board passenger vessels which carry passengers from a port in Malawi; the preparation and furnishing of particulars as to all passengers to or from a port in Malaw, regulating the number of passengers which a vessel may carry from a port in Malawi, whether or not the vessel is a passenger vessel; and prescribing the terms and conditions upon which ships may carry passengers between ports in Malawi.
- Part XIII of the Bill empowers the MoTPW Minister to make regulations with regard to the carriage of dangerous goods in the vessels on the inland waters of Malawi.
- Part XIV of the Bill provides for the handling of wrecks and salvage, including the appointment of the receiver of wrecks throughout Malawi.
- Part XV of the Bill provides for the administration of Malawi ports and related ports services. Part XV gives the Minister powers to make regulations for the regulations of the posts and ports services.
- Part XVI of the Bill provides for inquiries and legal processes on shipping casualties on the inland waters of Malawi.
- Part XVII of the Bill contains miscellaneous provisions which deal with the matters relating to: arrest and seizure; legal proceedings; offences and penalties.
- Part XVIII of the Bill contains repeal and saving provisions.

The Government's drafting of the Bill suggests a logical approach and good intentions to reform the legal and regulatory framework for the inland water sub-sector. In particular, there is a recognition that much existing legislation is out of date and a determination to reform measures which are archaic in their technical standards, do not fit to current or planned institutional structure and governance arrangements, or follow modern approaches to regulatory policy and practice.

There are several concerns surrounding the draft legislation by the NTMP moving forward. These are as follows:

- There is a lack of a clear and transparent policy basis for the proposed legislation so its delivery of NTP objectives and desired outcomes can be explicitly demonstrated.
- Some of the draft legislation appears to be "cut and paste" from other countries' frameworks, and the applicability, context sensitivity and practicality to Malawi's circumstances is not always clear.
- Pieces of legislation and regulation appear stand-alone and prepared in isolation, giving rise to an inconsistent approach to certain details between sub-sectors. For example, a new rail regulator is proposed in the draft Railways Bill whilst the Inland Water Bill maintains the role of MoTPW's DMS as both policy maker and regulator.
- In some cases, the level of detail included in primary legislation appears excessive and some provisions may be best to be provided under secondary regulations instead of the main Act. This would avoid overcrowding the primary instrument, enable flexibility, facilitate ease of amendments as needs arise, and reduce cost.
- There is a lack of regulatory integration across modes and sub-sectors which may create difficulties in making choices in infrastructure and service provision, promoting physical and operational interchange and inter-modal services.
- Legislation appears to lack explicit plans for practical implementation, including resourcing of new functions proposed, compliance monitoring, inspection and enforcement.
- Irrespective of legislation, there remain real capacity constraints in delivery on the ground – which means institutional reform and capacity building is essential to make any new or amended regulations effective in guiding the behaviour and compliance of key actors.

Finally, it is observed major delays to the process of proposing, drafting and achieving approval of key measures. This may require MoTPW to become a more efficient, process-led and effective sponsor of legislative and regulatory measures, the latter point discussed as a proposal in the Institutional and Regulatory Reform Plans.

The proposed reform plan is mainly aimed at improving safety and security, which is in line with the 2nd objective of the NTMP.

13.5 **Our Proposals for regulating the inland waterway sub-sector**

Since the 1990s, the Government has embarked on a series of major policy and structural reforms aimed at promoting the development and operation of an efficient and competitive transport sector for Malawi. A key theme has been the (functional and institutional) separation of public policy and planning, and of regulation and delivery, combined with the progressive commercialisation and privatisation of existing operations and opening up of the market to competition. The Government has also sought to embed these changes within an updated legal and regulatory framework.

This rationale lies behind the creation of a separate Road Authority and Road Fund Administration in 2006, concessioning of operations in rail and inland waterways, as well as liberalisation of road freight and passenger transport. Whilst the reforms in the roads sub-sector have been (relatively) successful, concessioning of rail and marine services (ahead of, and separate from, enabling legislation) has delivered far lower investment, operational efficiency or user benefits. Further reforms of policy intent, institutional, legal and regulatory frameworks, and associated funding mechanisms are therefore required, and have been proposed, to put these sub-sectors on a firmer basis.

On this basis, it is recommend that a new Inland Water Regulator be created, through revised primary legislation, responsible for port and inland water services licensing, network access, economic and technical regulation and safety certification and assurance. This largely reflects the view taken by the 2014 IMC Report. However, the scale of the inland water network, size of the fleet and demand for its services remains very small relative to road, and it will be organisationally inefficient and financially costly to establish maritime regulation as a separate and dedicated agency in its own right.

With this in mind, rather than rely on capacitation of the DMS, it is proposed that organisational amalgamation between planning and regulatory functions for different sub-sectors to shape the way forward. The arguments for this approach have already been set out elsewhere in the NTMP Institutional Reform Plan to ensure efficiency in resource use, stronger mandate and authority and integration of working practices.

The ultimate goal of this proposal will be to include inland water regulation within a new National Transport Authority (NTA). This will combine regulation of road operations, rail and maritime and wider economic regulation of transport costs within a single body responsible for all forms of surface transport.

The National Transport Authority will provide a strong, independent regulator which will supervise, monitor, direct and intervene as necessary to ensure Malawi's surface transport for road, rail and marine networks comply with technical and legal requirements, are safe, efficient and deliver public objectives at reasonable cost. In carrying out this function, it will have the following objectives:

- Regulate all surface passenger and freight transport activities in Malawi, including concessions, licenses, permissions or contracts granted by the Government;
- Ensure transport access is arranged between operators on a fair, transparent and non-discriminatory basis, subject to concessions, licenses and contractual agreements which may apply;
- Solely, or in conjunction with other agencies, develop and enforce technical standards for infrastructure, vehicles, other assets and operations;
- Determine, monitor and enforce transport charges, tariffs and fares;
- Monitor, determine and refer to the relevant delivery and enforcement agencies, anti-competitive, unsafe or other harmful behaviour by transport operators which may be against consumers' interest;

- Drive and promote the use of the surface transport sector, with a focus on those modes which are operationally efficient, economically advantageous and environmentally sustainable, as well as the integration between them, to the extent which is practicable and justified;
- Manage existing concessions;
- Advise Government (principally MoTPW) on new policy, law and regulations for surface transport sector, including the management and granting of new concessions and contractual agreements with the private sector;
- Participate in, and undertake activities in compliance with, relevant bilateral, international or regional agreements and obligations; and
- Solely, or in conjunction with other independent bodies, monitor and enforce surface transport health and safety, protect users and undertake or support investigations into all accidents involving harm to life or property.

As well as technical, economic and social remits, the Authority will also provide independent safety regulation, certification and assurance for the rail and inland water sub-sectors.

Detailed organisational design, legal establishment and development of processes and systems will need to be undertaken once the Government of Malawi approval of the proposal has been granted.

It is recognised that creating the NTA represents an ambitious agenda at the current time, especially given the challenges of developing the Roads and Traffic Authority from the current Department for Roads, Traffic and Safety Services. Therefore, it is proposed that the first stage of creating the NTA should be the creation of a new Rail and Maritime Authority (RAMRAM), with the potential to incorporate regulation of road operations at a later date.

The first phase for the Rail and Maritime Authority will perform similar functions as the NTA for rail and inland water modes, as well as wider economic regulation, but omit direct jurisdiction over road operations, until such time as restructuring involving DRTSS and its transition to RTA is complete and embedded.

Proposed organisational arrangements and functions for the RAMRAM are set out below, with a dedicated department focused on inland water and port regulation and concession management. Establishing and building this body will be a major exercise and will require well-structured and sequenced implementation plans. It will also need to consider regulatory compliance monitoring and enforcement procedures, capacity and focus. For inland waters, it may be possible to let inspection and enforcement activities to a private contractor, funded from marine user fees and income from fines and penalties.

The draft Inland Waters Shipping Bill[6] may need to be amended, in due course, to take account of the proposals, including the relationship between the Authority and the PPP Commission in letting and managing concessions.

It is important the revised Bill also defines the residual functions of MoTPW with regards to setting of inland waters and port policy and monitoring and oversight. It should also make provisions for the Minister and the RAMRAM to make secondary regulations of various kinds, issue guidelines, set and enforce penalties and take steps, where relevant to harmonise Malawi domestic and regional standards. Clearly the process of creating the RAMRAM and clarification of residual MoTPW functions will have a major impact on the size, structure and role of the current DMS. In the Institutional Reform Plan, produced in parallel with this Sub-Sector Plan, it is proposed an early Functional Review of the Ministry to allow its future functions and capacity to be updated and refined to be fit for purpose as a modern and efficient policy making and oversight body.

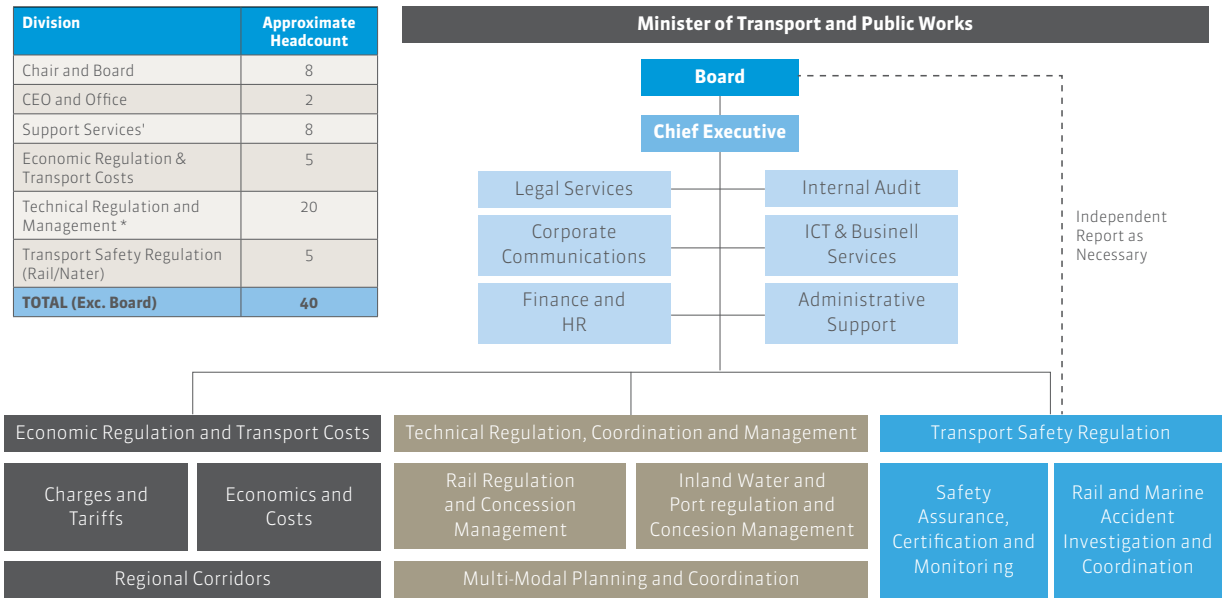
Were the draft legislation to be re-introduced in 2017, then creation of the independent inland waters and port regulatory function and clarification of MoTPW's policy role ought to be enabled, with appropriate capacity building and technical assistance by 2019.

The above proposal intends facilitate an integrated water transport mode in Malawi, which is in line with the IWT Sub-Sector plan objective.

6 It may be possible to draft a combined Railways and Inland Waters Shipping Bill.

Figure 13.1 Proposed structure for Malawi rail and maritime regulator (RAMRAM)

Division	Approximate Headcount
Chair and Board	8
CEO and Office	2
Support Services'	8
Economic Regulation & Transport Costs	5
Technical Regulation and Management *	20
Transport Safety Regulation (Rail/Nater)	5
TOTAL (Exc. Board)	**40**



Overall Role of Authority

A strong, independent regulator which will supervise, monitor, direct and intervene as necessary to ensure Malawi's surface transport for rail and marine networks comply with technical and legal requirements, are safe, efficient and deliver public objectives at reasonable cost.

Key Functions

1. Regulate all passener and freight transport activities by rail and inland water in Malawi, including infrastructure, concessions, licenses, permissions or contrads granted by the Government.
2. Ensure transport access is arranged between operators on a fair, transparent and non-discriminatory basis, subject to concessions, licenses and contractual agreements which may apply.
3. Solely or in conjunction with other agencies, develop and enforce technical standards for infrastructure, vehicles, other assets and operations.
4. Determine, monitor and enforce transport charges, tariffs and fares.
5. Monitor, determine and refer to the relevant delivery and enforcement agencies, anti-competitive, unsafe or other harmful behavior by transport operators which may be against customers' interests
6. Drive and promote the use of the rail and maritime sectors with a focus on those modes which are operationally efficient economically advantageous and environmentally sustainable, as well as the integration between them, to the extent which is practicable and justified.
7. Advise Government on new policy, law and regulations for the rail and maritime sectors, including new infrastrudure investment the management and granting of new concessions and contractual agreements with the private sector.
8. Participate in, and undertake activities in compliance with relevant bilateral, international or regional agreements and obligations
9. Solely, or in conjunction with other independent bodies, monitor and enforce health and safety, environment, protect users and undertake or support investigations into all accidents involving harm to life or property.

Key Organisational Elements

1. Independent Board and Appointment Procedures of 6 – 8 Members
2. Executive – around 40 Professional Staff, Technical Support & Processes
3. Departments for Rail, Ports and Maritime, plus Economic Regulation and Costs
4. Working Protocols with Range of Other Agencies, including RA, MoPTW, District Councils, PPP & Competition Commissions, Police & Regional Corridor Bodies.
5. Incorporates Independent Transport Safety Regulator for Rail and Maritime.

Chipoka Port

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14 Action plan

Inland Water Transport Sub-Sectoral Plan

14 **Action plan**

14.1 **Developing the businesses**

A major component of the IWT planning is the project assessment and optimisation in which the port project's feasibility is assessed and the implementation strategy is developed. It is important to distinguish private and public roles at this stage to be able to develop a viable financing strategy.

The two concessionaires need to develop credible business plans for the next 5 years based on targets of increasing freight traffic and providing realistic passenger services which satisfy customer needs. The business plan is to provide estimated costs and revenue projections.

This will first require identification of potential freight market, potential customers, route and volumes. Once potential for the market has been assessed, the two concessionaires, together with DMS, will need to identify if the current facilities can cope with the expected volumes to be transported as well as required capital investment for vessels and ports improvement. Capital investment should be broadly divided into the following groups:

- Rehabilitation of existing port facilities;
- Expansion of port facilities; and
- Development of a new port.

MSC should examine the project's financial feasibility on the basis of forecast cash flows. A major criterion for the financial feasibility is the profitability which is expressed by the Internal Rate of Return (IRR). The following should be accounted for:

- Capital expenditure (CAPEX) which includes new assets or rehabilitation/upgrade of existing assets;
- Operational expenditure (OPEX) which includes maintenance and repairs, labour and utilities;
- Revenues which includes land rent, port dues, quay charges and cargo handling charges;
- Inflation rates;
- Loan conditions; and
- Taxes.

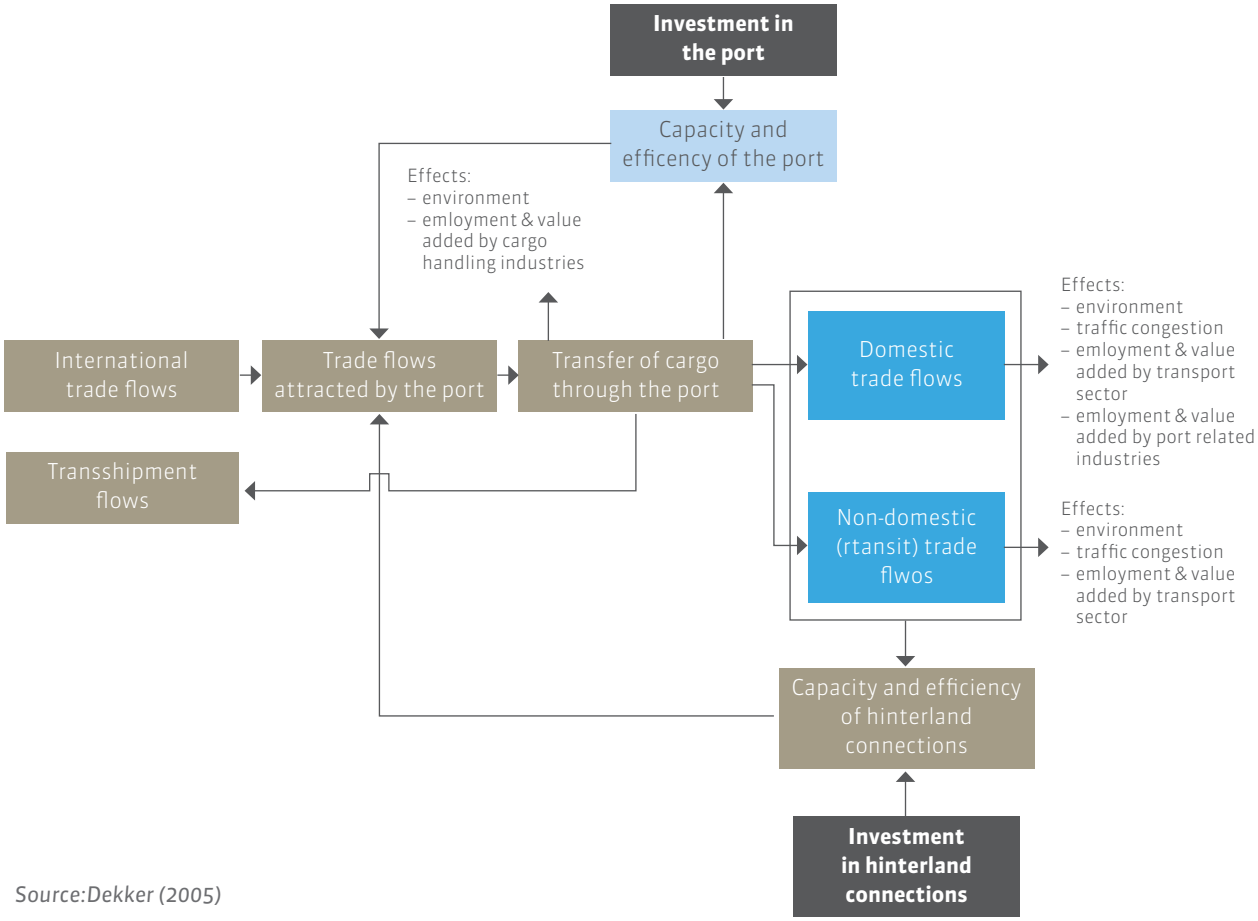
In principle, the port(s) development should earn a satisfactory financial rate of return but this might be difficult to achieve during the first years of operation as it might take some year for the traffic to build up especially given the current reputation of IWT and required rail connection development. It is therefore recommended that an implementation plan over 20 years is developed with the rate of capital investment increased as the traffic (and revenue) increases.

An 'aggressive' marketing strategy will then need to be put in place to attract potential customers.

Figure 14.3 presents a schematisation of the components and their inter-relationships, relevant for port planning. This schematisation essentially identifies the different potential investments and effects associated with the cargo flows through a port including its hinterland connections. So, in deciding on port development from a national welfare perspective, port planners should weigh the benefits due to the development against the costs.

7 The IRR of an investment is the discount rate at which the present value of the costs (negative cash flows) of the investment equals the present value of the financial revenues (positive cash flows) of the investment. The investment is considered financially feasible if its IRR is greater than an established minimum acceptable rate of return or cost of capital, which is determined by IRRs of alternative investment opportunities of the port authority or terminal operator (depending on who the investor is).

Figure 14.1 Schematisation of a port from a national welfare perspective



Source:Dekker (2005)

14.2 Interventions proposed within the existing concession agreements

The current concessions are not financially sustainable as they are. MSC and MPC have not paid the concession fees and MPC is not investing in the port infrastructure while the funds provided by the Government to the marine services have been regularly reduced. There is very little point in making important capital investment without the guarantee of a return on investment and the development of a valid business plan at this stage.

Interventions under the current concession should be made to limit financial losses while providing minimum service to passenger. As such, it is recommended that the existing passenger service is split between the north and the south with a base established at Nkhata Bay, under the MSC concession.

14.3 Identification of required amendments to the concession agreements

Government and port authorities around the world have withdrawn from port operations, knowing that the private sector will allow for greater flexibility, efficiency and better services to port customers. This was the case in Malawi when the concessions for the shipping and port operation was granted to Mota-Engil in 2010 and 2012 respectively. The objective of the port concession was to increase efficiency in port operation, decrease cost of port services to stakeholders, decrease cost to the Government and attract private sector participation to invest. The results of the study finding indicate that the objectives have not been met. It shows that either the Government or the concessionaire or both may not be working in line with the terms of the concession:

- There has been no significant improvement to the port infrastructure;
- The cost of port services to users has not reduced;
- The reliability and efficiency of ports and shipping have not improved; and
- The connection to rail network is not currently available.

All the above have had a negative impact on the IWT reputation. The ports and IWT are not appealing to shipping companies at present. The productivity of ports should be enhanced through a targeted formulation and implementation of approved policies.

14.4 **Implementation plan**

The proposed implementation plan can be developed in 3 phases as shown in Figure 14.4 and summarised below:

Short term plan (< 5 years)

The concessionaires are currently losing money and have not been paying the concession fee. The short term plan should allow for a review of the concessions with some immediate actions to improve the financial viability of IWT operations. A clear and viable business plan for freight operation should be developed and the passenger operation should be improved.

Merge the two concessions. There is merit in having a single concession for a better integrated service. Inland waterway services, inland terminals/ports and end-leg road/rail services depend on the individual operations of the barge carriers, terminal operators and road/rail hauliers. They usually act separately and this tends to be the major obstacle to the development of competitive barge transport. An essential condition for the development of inland waterway services is the integration of combined transport operators who manage IWT services, ports and terminal haulage.

Two concessions have the advantage of bringing more competition to the service and spreading risk between concessionaires. In larger countries or IWT networks, there is a concession for every single terminal with private shipping companies.

Medium term plan (< 10 years)

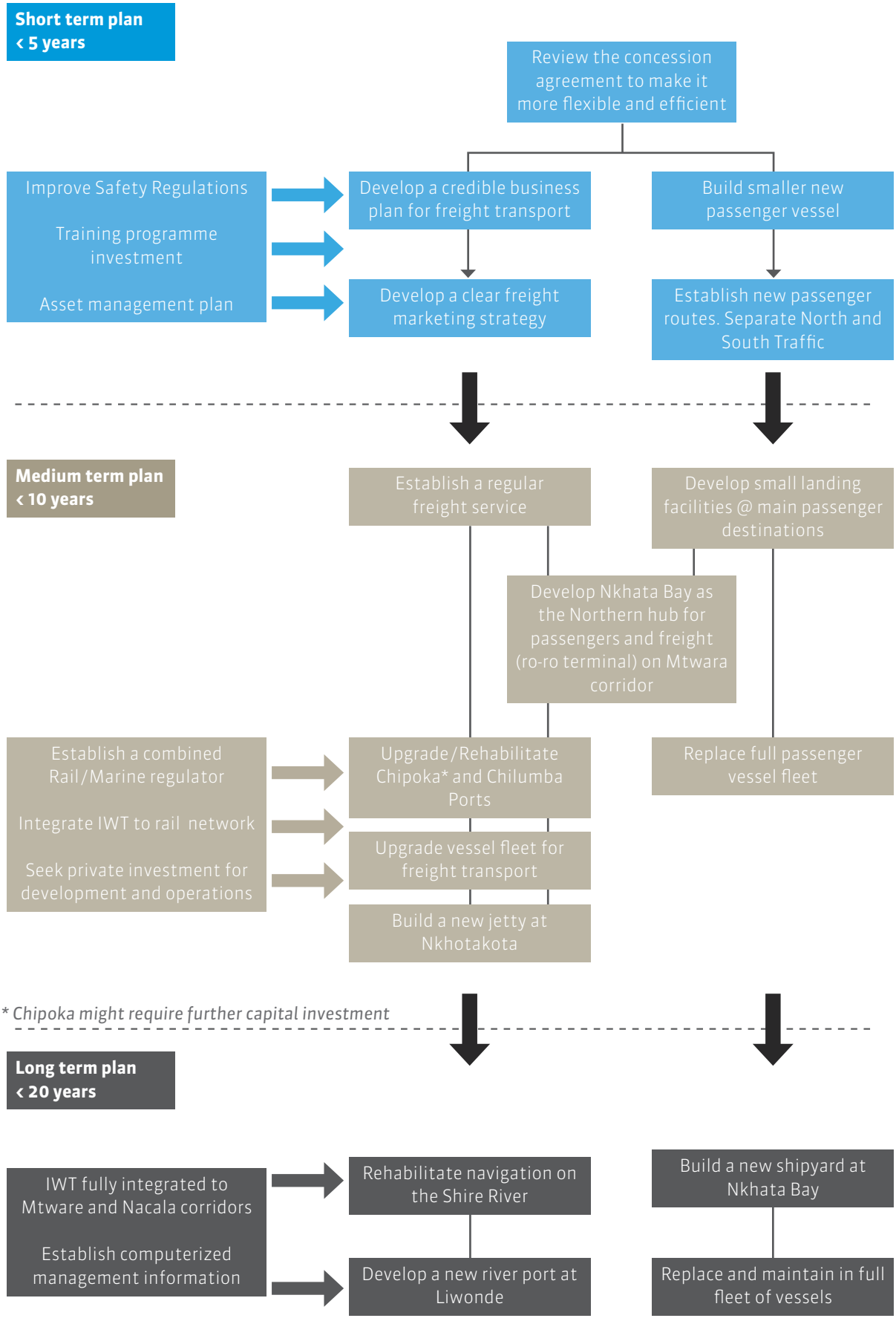
Providing that there is a business case to develop IWT and that the regional anchor projects such as Nacala and Mtwara corridors are developed, some initial capital investment at strategic ports should follow. This should seek to establish a northern hub for passenger and freight at Nkhata Bay. The port has a favourable geographical position on the Mtwara corridor and there is a high demand for passengers to Likoma Island and the northern settlements. Upgrade and rehabilitation of existing ports should also take place.

Long term plan (10-20 years)

The long-term plan will allow for the full integration of the IWT to the railway network. Further capital investment such as the development of a new river port on the Nacala corridor at Liwonde should be promoted. A new shipyard should also be developed and the full fleet of vessels replaced to allow for sustainable IWT.

Infrastructure should be climate proofed. Probabilities of highest water levels are derived taking into consideration sea level rise for sea ports. The same could be done for low water levels on lake and the structures designed taking this into consideration. Allowance should be made for variations and it is recommended to dredge a pocket at berths and access channels to cope with expected water levels.

Figure 14.2 Proposed implementation plan for IWT



Navigation simulator at the
Marine Collage in Monkey Bay

Malawi National Transport Master Plan

15 Intervention costs

Inland Water Transport Sub-Sectoral Plan

15 Intervention costs

Nkhata Bay Port (US$ 20 - 25 million):

- A new ro-ro berth to accommodate ro-ro traffic to/from Mbamba Bay (Tanzania) which will be linked to Mtwara port. Nkhata Bay would also be linked to the road network to Zambia. The size of the terminal and ro-ro vessels will be dependant of the demand forecast for ro-ro traffic across the lake and maximum size the dry dock can handle for vessel construction;
- Customs offices and warehouses;
- Parking space for lorries using the ro-ro terminal;
- A general cargo berth (either lo-lo or ro-ro) for freight service to other ports across the lake;
- New cargo handling equipment;
- Storage area;
- Maintenance workshop; and
- A dedicated passenger terminal for Likoma island and Tanzania.

There are plans to develop **new shipbuilding and ship repair facilities** at Dindano in Nkhata Bay District at an estimated cost of US$ 75 million.

Chipoka Port (US$ 10 to 15 Million):

- Extension of the existing quay. This could be in the form of building a new and deeper sheet pile wall in front of the existing quay. Alternatively, the existing quay wall could be extended to deeper waters but this has the disadvantages of having a section of the berthing facilities made redundant;
- Dredging of a new access channel and at the berth; and
- New equipment.

Liwonde River Port (US$ 15 to 20 million):

- New general cargo berth;
- New storage yard, warehouses and handling equipment;
- New railway connection; and
- New navigation channel (potential dredging).

New fleet of vessels

Passenger:

- Around two 50 passenger ferries and one 200 passenger ferry Ro-Ro vessels which are equipped with an after ramp or a front ramp for loading and offloading vehicles and Lo-Lo barges which require lifting equipment for loading and offloading cargo are also more appropriate for freight transport;
- Depending on the size and type, the cost per vessels would be in the order of US$ 1 to 5 million.

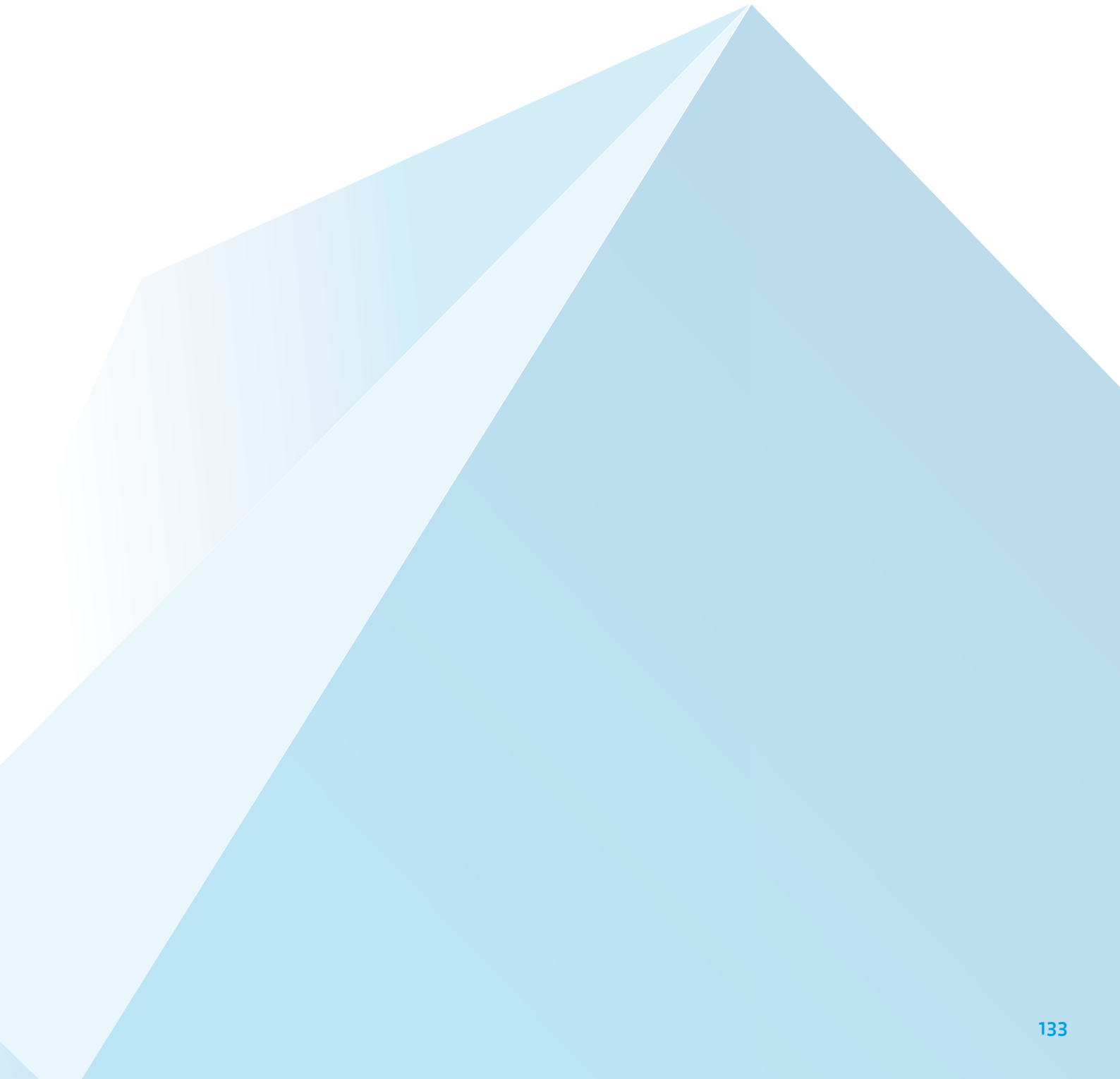
Piers:

- Upgrade/construction of a dedicated landing pier for export of sugar at Nkhotakota (US$ 1 to 5 Million);
- Equipment upgrade at **Chilumba** port for loading/uploading of cargo (US$ 1 to 2 Million) various small landing stages at **Likoma**, **Makanjila** and **Mulowe** (around US$ 0.5 Million each).

Table 15.1 shows the proposed interventions and costs over the 20 year planning period.

Table 15.1 Proposed interventions and costs over the 20 year planning period (US$ million)

	FY2017 - FY2022	FY2022 - FY2027	FY2027 - FY2032	FY2032 - FY2037
Major Projects				
NhataBay RoRo Terminal	-	25,000,000	-	-
Chipoka Port	-	15,000,000	-	-
Chilumba Port	-	2,000,000	-	-
Nkhotakota Jetty	-	5,000,000	-	-
Upper Shire navigation	-	-	-	-
New shipyard Nkhatabay	-	-	30,000,000	45,000,000
New River Port Liwonde	-	-	-	20,000,000
New passenger vessels	5,000,000	-	-	-
Replacement of passenger vessel fleet	-	10,000,000	-	-
RoRo vessels	-	15,000,000	-	-
New freight vessels	-	-	-	-
Nsanje World Inland Port	-	-	-	-
Minor capital works and programmes				
Small landing projects	3,000,000	-	-	-
Establish new passenger routes	1,000,000	-	-	-
Establish regular freight service	1,000,000	-	-	-
Institutional and regulatory				
Establish RAMRAM	1,000,000	-	-	-
RAMRAM running costs	1,250,000	1,250,000	1,250,000	1,250,000
Merge Concessions	1,000,000	-	-	-
Improve safety regulations	5,000,000	-	-	-
Training programme investment	1,000,000	-	-	-
Asset management plan	1,000,000	-	-	-
TOTAL	**20,250,000**	**73,250,000**	**31,250,000**	**66,250,000**



Monkey Bay shipyard

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16 Recommendations

Inland Water Transport Sub-Sectoral Plan

16 **Recommendations**

The recommendation made in this report reflect the objectives set out in section 1.3.2 and can be summarised in the table below:

Recommendation	Strategic Objective	Operational Objective
1. Review and amend the concession as it is not viable at present.	Needed to strengthen sub-sector to meet all objectives	
2. Government to enforce policies and regulations.	2	2
3. MSC to develop a viable business plan and to apply an aggressive cargo marketing campaign.	1	1
4. Revival of the IWT to follow the development of major SADC anchor projects: ▪ Development of Nkhata Bay ro-ro facilities associated with the Mtwara corridor ▪ Development of a new river port at Liwonde (possibly associated with proposed dry port on the Nacala corridor) or/and redevelopment of Chipoka port.	1 1	1 1
5. Identification and development of main ports to be supported by a network of smaller ports or landing facilities for freight movement and distribution across the lake;	1	1
6. Lake transport to be fully integrated with the multi-modal transport network with rail and road;	1	4
7. Passenger ferry service to be made more efficient with split in services to be aligned with the passenger demand;	3	5
8. MSC's fleet to undergo comprehensive rehabilitation/replacement. Current fleet of vessels to be slowly replaced by more adapted, smaller, fuel efficient vessels;	1	1
9. Staff manning the vessels, facilities and ports to undergo appropriate training;	2	2
10. Improved navigation aids and safety regulations;	2	2
11. Computerized management information and accounting systems to be established;	1	1
12. Create a regulatory authority for inland water and ports, either a standalone body, or as a combined body with the rail sector;	1,2	1,2
13. Draft and gain approval for an Inland and Shipping Act; and	2	2
14. Define the relationship between a new regulatory body and a restructured department of marine services in the MOTPW with adequate skills and capacity.	1, 2	1,2

Storage facility at Chipoka Port

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References

Inland Water Transport Sub-Sectoral Plan

References

- Ministry of Transport and Public Works, 'Seventh Joint Transport Sector Review – Performance Review for the Water Transport Sub-Sector', December 2015.
- IMC Worldwide, 'Technical Assistance Under the Malawi Road Sector Policy Support Programme, Review of the Inland Waters Shipping Act', Draft Interim Report, February 2014.
- IRIS, 'Institutional Support to the Malawi Ministry of Transport'.
- The World Bank International Trade Department, 'Malawi Trade and Transport Facilitation Audit', September 2004.
- STTE Consortium, 'Malawi Transport Sector Multimodal Development and Potential Public Private Partnership Study', November 2010.
- TERA International Group, 'Road Maintenance and Rehabilitation Project, Malawi Transport Cost Study', April 2005.
- 'Inland Waters Shipping (Ports and Harbours) Regulations' (draft), 2016.
- 'Inland Waters Shipping (Navigation) Regulations' (draft), 2016.
- 'Inland Waters Shipping (Tonnage and Dimensions) Regulations' (draft), 2016.
- 'Malawi National Transport Policy', April 2004.
- Nathan Associates Inc., 'Definition and Investment Strategy for a Core Strategic Transport Network for Eastern and Southern Africa – Corridor Review and Performance Report', 2011.
- SADC, 'Regional Infrastructure Development Master Plan, Transport Sector Plan', August 2012.
- Central Consultant Inc., 'Project for the Study on Development of the Sena Corridor in the Republic of Malawi, Draft Final Report', January 2012.
- The International Bank for Reconstruction and Development/The World Bank, 'The Zambezi River Basin - A Multi-Sector Investment Opportunities Analysis', 2010.
- USAID, 'Institutional Support to the Malawi Ministry of Transport'.
- PIANC Report 158, 'Master Plans for the Development of Existing Ports', 2014.
- PIANC Report WG21, 'Economic Aspects of Inland Waterways', 2005.
- PIANC Report 111, 'Performance Indicators for Inland Waterways Transport', 2010.

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