Beira Corridor: Creating a Seamless Integrated Regional Transport System

Diagnostic and Options Study

Executive Summary

28 March 2013

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Executive Summary

Mozambique serves as an international trade gateway for the landlocked SADC countries of Zimbabwe, Zambia, the DRC, Malawi and Botswana, providing the shortest distance to the regional sea ports of Beira, Nacala and Maputo respectively. However, the main transit corridors and ports in Mozambique were severely disrupted during the 15 year civil war between 1977 and 1992, which resulted in the shift of international trade with the land locked countries to other regional corridors and ports, mainly Dar es Salaam and Durban.

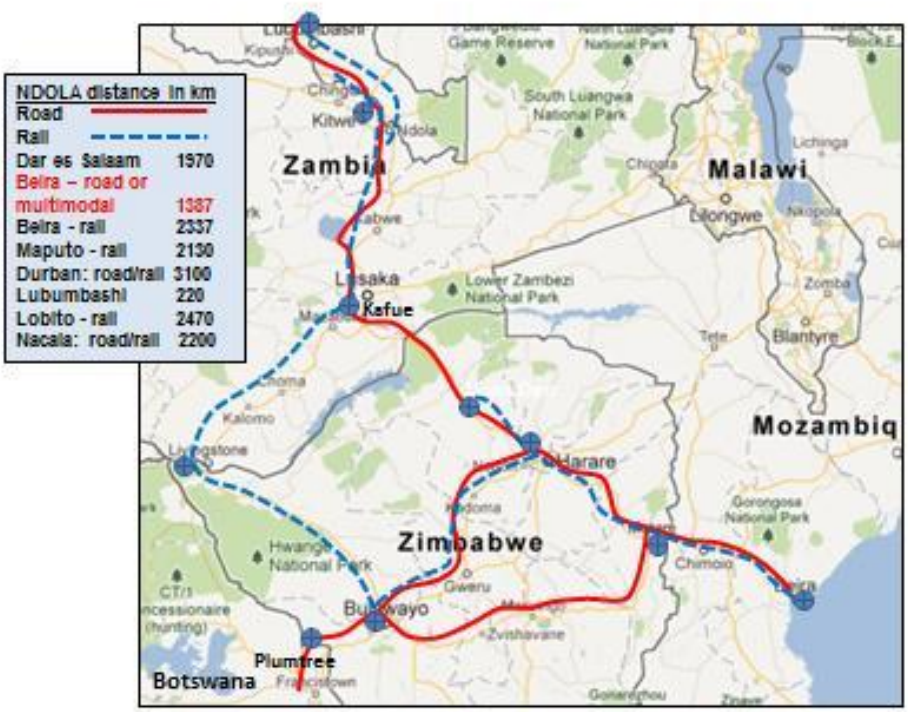
The Beira Harare corridor was kept operational throughout the war because of its economic importance for Zimbabwe international trade. The Beira Corridor transport system received more than US$ 400 million in donor funding during the period 1986 to 1996, and projects included a new container terminal, new oil terminal, road upgrading and dredging of the port and access channel. Since then there have been major developments and investments in all 3 main corridors in Mozambique, driven by large anchor projects such as Mozal in Maputo and the Moatize coal mines at Tete, and also the on-going recovery in the agricultural sector. More than 50% of the Beira port throughput is now generated by Mozambican trade, whereas before 1995 it was less than 20%.

The key objective of the regional component Mozambique Regional Gateway Programme is to ensure that recent transport corridor developments and investments in Mozambique also translate into trade benefits for the Southern African landlocked countries. The focus of this study is specifically on the Beira-Harare component of the corridor, primarily and traditionally serving Zimbabwe, but also Zambia, Southern DRC and Northern Botswana providing the shortest route any regional port by about 500km.

The land transport distance advantage could reduce transport costs for international trade by between US$30/t and US$50/t, compared to the longer route via Durban in South Africa, which could translate into as much as 10% of the average value of the goods passing through the port. This saving could be an enormous boost to international trade competitiveness for the region.

Overall Corridor Performance

The overall performance of the Beira-Harare Transport Corridor has always been linked to the capacity and constraints at the port. With the mining and agricultural sector developments in central Mozambique, freight volumes and direct vessel calls at Beira have increased, making the port more attractive for the land locked countries. In the past, prior to year 2000 and the commencement of the railway concession process, freight along the Beira-Harare corridor was mainly carried by rail. This has now almost exclusively shifted to road, except for granite exports where loads are too heavy for road. Rail transport has suffered from poor reliability, long transit times and higher costs than road, particularly on the Mozambique section of corridor, although this is now being addressed by CFM.



Trade and Traffic Flows

Freight flows through the port are now being dominated by coal exports, which are expected to account for up to 6mtpa during 2013. It is planned to increase the Sena line capacity up to 12mtpa within a few years, subject to port terminal capacity being increased (new coal terminal). However, even without the coal exports, the port handled about 3.8 mtpa of traffic in 2011, more than the previous maximum handled before 1975. Freight volumes along the Beira-Harare Corridor have, however, remained fairly static at abo 0.9 mtpa, partly because of the economic decline in Zimbabwe, and partly because of increased flows along the NS corridor linked to trade with South Africa.

Beira Port Statistics 1995 – 2011						
Year	1995		2011		2012 (est)	
	mtpa	%	mtpa	%	mtpa	%
Total throughout, excluding oil	1.4	100	4.1	100	7.5	100
Teus – total / mtpa	23000/ 0.23	16	160000/ 2.15	52	180000/ 2.4	32
Coal Exports from Moatize	0	0	0.3	8	3	40
Total Zimbabwe transit traffic	0.9	65	0.8	20	0.9	
Zimbabwe Volume carried by Machipanda Rail	0.85	94	0.3	37	0.2	22

It is clearly difficult to predict future traffic flows along the Beira-Harare corridor, because it will depend on the diversion of freight from other corridors, such as the NS corridor to

Durban, the Dar es Salaam corridor and the Walvis Bay corridor, and to a lesser extent the Lobito Corridor. While the capacity of the Beira container terminal is being increased, with throughput exceeding 180 000 teus pa, enough to attract increasing direct vessel calls, the general cargo quays are experiencing congestion because of the demands of coal exports. Several Zambian importers are now looking at switching to Dar es Salaam or Walvis Bay in order to avoid port congestion and high vessel demurrage charges. In the short term, until a new Beira coal terminal is built, general freight along the Beira-Harare corridor is not expected to increase, perhaps even decrease. It is expected that container traffic along the corridor will increase, and that there will be a diversion of regional imports and exports from Durban port to Beira port, particularly if the intermodal railway service along the Machipanda railway can be re-established. This will require the rail service to become price and performance competitive with road. A railway operational analysis has been based on the following modest rail freight targets, increasing from the current 0.3 mtpa to 0.8 mtpa.

High Level Estimate of *Short Term* (2013) Freight Volumes on the Machipanda Line		
	Imports mtpa	**Exports mtpa**
Granite		0.12
Fertilizer	0.20	
Containerised General Cargo (50% import market)	0.15	0.08
Grain & rice – speculative, highly variable from year to year, but providing capacity is important	0.10	0.03
Wood Products		0.02
Mining Consumables and equip.	0.05	
Mining and Agri Commodities		0.05
Total Transit Freight (0.8 mtpa)	**0.50**	**0.30**

It has been noted that there is an increasing tendency to shift traditional bulk traffic from 'break bulk' to containers. This includes copper, fertilizer and even wood logs. The reason for this is increased security and greater ease of handling – it is much quicker to load a container onto a wagon or truck than to load break bulk, allowing for better equipment utilisation and reduced unit fixed costs. However, the additional weight of the container is a cost factor on road, but much less so on rail.

Port Operations

- Siltation of the Access Channel. The port is situated at the mouth of the Pungue river and suffers from siltation of both the terminals and the more than 30km long access channel. The tide at Beira is between 5m and 6m, and the access channel depth must be kept below 8 to allow vessels with a draft of 12 m (Handymax, 20 000 to 50 000 dwt). The port was capital dredged in 2011, but the existing maintenance dredgers are not able to remove the 2 mtpa of silt deposited every year. The access channel has already lost some depth and this will only be remedied when the new Danida financed dredger arrives in mid-2013.
- Access Channel Congestion. Larger vessels can only access port at high tide, and as the coal exports pick up, this could restrict other larger vessels from access to the

port. Coal exports of 6 mtpa will require a 35000 dwt vessel to enter and leave the port every second day, at 12 mtpa it will be every day.

- General Cargo Terminal Congestion. The coal export vessels are longer than the length of the berths, and there are times when coal is loaded at both Berth no 8 and no 9, effectively using 3 berths. This has caused berthing delays of up to 3 weeks for importers, with very high demurrage costs – about US$ 1/t per day, and some Zambian importers are looking at shifting to Dar es Salaam or Walvis Bay at twice the distance. The container terminal is not affected by this, and there has been an increase in both direct and coastal container shipping services to Beira (Maersk, DAL, etc). At quay No 8, a vessel can be loaded in less than a day, at quay No 9 loading can take up to 5 days.
- Road and Rail Access Constraints. Both road and rail access to the port terminals are poor, with insufficient capacity, particularly with increased growth of imports. A large proportion of mining equipment and consumables for Vale and Rio Tinto are still imported through Durban by road. Other regional ports have developed remote ICDs or container freight stations (CFSs) in order to relieve terminal and city truck congestion, and for empty container storage.

Road Transport

- Road Condition. The road haulage services perform reasonably well, but suffer from poor road conditions between Beira and Inchope, which has existed since the major floods are 2002. Beacon Hill is reportedly exporting up to 0.5 mtpa of coal by road from Moatize (40 heavy trucks per day in each direction) and this will cause further deterioration and road congestion. Jindal is planning to export up to 2 mtpa within the next 2 years, equivalent to 200 trucks per day in each direction.
- Gross Vehicle Mass. Mozambique has now permitted the use of 7 axle, 56t combination trucks (interlinks), which can carry 32t of freight. The exception is the Tete bridge, where the load is restricted to 48t, until the new bridge is completed.
- Truck Stops. The lack of formal truck stops along the route, and consequently poor efficiency, safety and security.
- Truck Holding Areas at the Port. The absence of a formal truck holding area and entry procedures at the port entrance causes congestion, delays and security /safety problems. Imperial Logistics/Colbro cite this as a serious problem.
- Road Safety and Security. The main access road to the port is routed through a densely populated built up residential area, with no street lighting and a high incidence of pedestrian accidents. Besides the safety issue, this can cause the truck to be impounded
- Border Post at Forbes / Machipanda. The border currently handles about 75 trucks per day in each direction, and is not considered to be severely congested. Truck transit times between Beira and Harare are about 2 days, with one day spent at the

border. Truck volumes will decrease if the Machipanda rail intermodal service is re-established.

Rail Operations

- Loss of Service. During 2012, after the cancelation of the CCFB concession, rail freight level fell to an all-time low, due to long and unreliable transit times, 10 days or more and high rail tariffs, up the US$ 80/t (UScents 12/ntkm). The service on the CFM section is expected to be normalised during 2013, and the target rail tariff for Beira Harare should be of the order of $40/t.
- Infrastructure Condition. Track condition has been very poor on the Beira Machipanda section of the line, 90km of speed restrictions with many derailments, but this has been partly rectified by CFM, but further upgrading is required. The NRZ section of the line to Harare mainly requires the rectification of deferred maintenance. The whole line is considered operational, but with speed restrictions.
- Equipment Availability. The availability of locomotives and wagons has mainly been a problem on the CFM section, even with the very low traffic volumes, and NRZ has assisted with through running of trains. There are large numbers of stabled but serviceable locomotives and wagons on the NRZ system, but raising finance has been the main problem.
- Seamless Service. The railway service is hampered by delays at the border interchange point – inspections and locomotive switches. A seamless service is needed to make the railway competitive with road, with similar transit times and lower tariffs.
- Congestion on Rail. The operation of 3 short trains per day will give the Machipanda line a capacity of more than 1.25 mtpa in each direction, a total of 2.5 mtpa, well within the capacity of the track. However, the short 30 km link between the port and Dondo is a single line which will carry 7 or more coal trains per day in each direction. This may result in an operating slot constraint for the Machipanda line. There are 2 passing loops on the Dondo Beira section, so with reasonable efficient train control is should not become a constraint until traffic levels reach in excess of 12 to 15 trains per day in each direction. It has been noted that during February 2013 all services on the Sena line were disrupted due to flood damage, but this vulnerability is planned to be rectifies with upgrading of the line during the 2013 dry winter season.

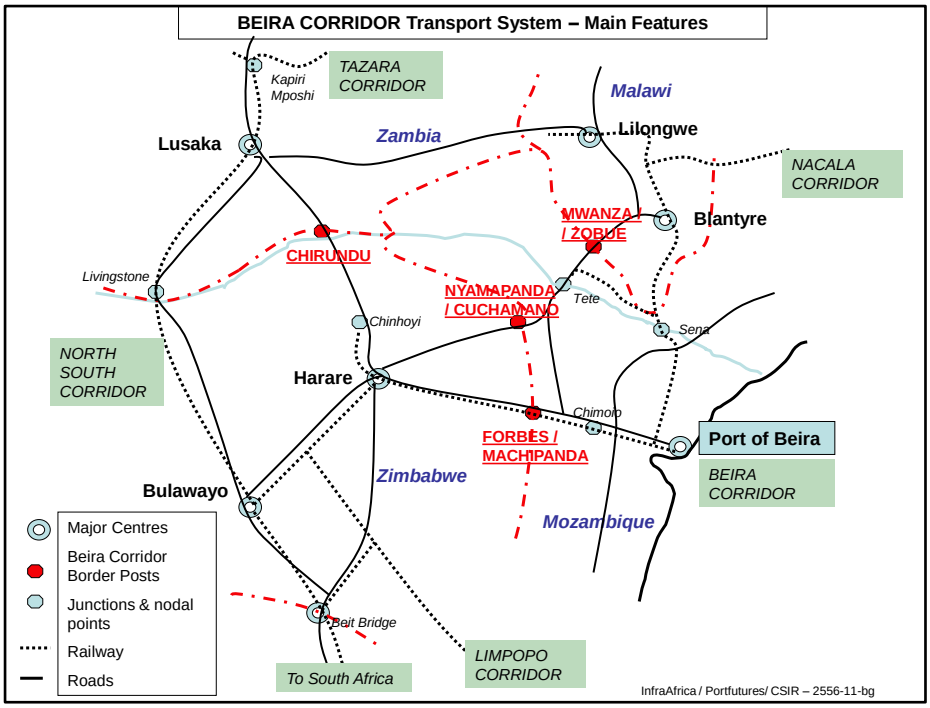
Inland Terminals

- Beira ICDs. Bridge Shipping and J&J Transport (Beira Logistics Terminals, BLT) operate large ICDs in Beira, including warehousing, customs facilities and stuffing and destuffing of containers.

- Mutare ICD. This is operated by Cornelder as a freight distribution and consolidation centre and has customs clearing facilities.
- Harare ICDs – The main intermodal road / rail terminal at Lochinvar in Harare has been concessioned to Manica, who are required to upgrade and expand the terminal. It has rail sidings, gantry cranes and warehousing facilities, but the future success of the ICD will depend on the rival of intermodal rail services on both the Machipanda line and NS corridor. A similar ICD is operated by BAK Logistics, where the capacity is severely underutilised. Both companies operate ICDs in the copper belt.

Corridor Trade Facilitation Issues

- Several trade facilitation studies have been carried out over the past 10 years, aimed at reducing the cost of transportation and increasing trade volumes along the Beira Corridor – Beira Corridor Cross Border Trade Facilitation, SADC, 2005; Zambia Trade and Transport Trade Facilitation Audit, World bank, 2004; Zimbabwe Trade and Transport Facilitation Assessment, World Bank, 2012 and lastly the very useful Logistics Overview of the Beira and Nacala Corridor, USAID, August 2012.
- While trade and freight volumes along the Harare Beira corridor have remained fairly static over the past 20 years, mainly due to the decline in the Zimbabwean economy and the constraint in Beira port, a significant improvement has been implemented by the establishment of a one stop border port (OSBP) at Chirundu.
- Harmonisation of Regulations –Mozambique has now harmonised road transport regulations with SADC for the first time on the Beira Corridor allowing access to 56t GVM, 7 axle interlinks, except for the 48t weight limitation on the Tete bridge on the Malawi route.
- Customs Procedures Improvements – During 2012 Mozambique introduced the single window customs clearing system which has reduced processing times in Mozambique. Zimbabwe and Zambia use the Asycuda++ system.
- Safety / Security – This remains a key issue for truck operators, with the lack of formal truck stops, the absence of a truck holding area at the port, and the dangerous road aces to the port.
- Competitiveness – Interviews with transport and logistics operators have indicated that the main obstacles to improved competitiveness of the Beira Harare Corridor as a preferred regional transport corridor for international trade, is the effective collapse of the railway service and the congestion at the general freight terminals at the port
- Beira Corridor Group – this was successful private and public sector sponsored company, which had the prime objective of trade facilitation on the Beira Corridor. BCG operated between 1984 and 2000, but closed due to the declining economy in Zimbabwe, and has not been replaced since.



Proposed Developments and Interventions

Port

- Coal Terminal Relocation. In the medium to longer term, the existing coal terminal at Beira will have to be closed or relocated to another site away from the general cargo berths. The terminal is in the wrong place both in respect of port operations and environmental concerns. The existing terminal also has limited capacity of 6 mtpa, and vessels sizes limited to 35000dwt. The existing master plan shows a new terminal to be built further upstream, where an 80 ha site has already been prepared by the filling of dredged material. This will be addressed by a revised port master plan to be carried out by Deltares during 2013, to plan forward to the year 2035.
- Maintenance Dredging. This appears to be in hand, but remains critical to the competitiveness of Beira as a regional port. Without maintenance dredging, it takes about 4 years for the dredged access channel to effectively disappear, limiting access to larger vessels. Prior to the dredging contract in 2011, the permissible vessel draft was 8 m on the tide. The new Danida funded dredger is planned for delivery in mid-2013, and will start with a backlog. Beira port should set up a fixed dredging levy on all cargo throughput to be paid to Emodraga.
- Expand General Cargo Berths. This is the stated intention of Cornelder / CFM, and is necessary to offset the congestion caused by coal exports through the general cargo berths. This will be addressed in the revised port master plan.
- Develop Container Freight Station/ ICD. This is fairly standard practise in most developing ports. The objective is to reduce congestion within the port terminal, which would affect the overall efficiency of movement (increased crane moves per

hour, and hence lower shipping costs). The concept is to set up an inland ICD served by an efficient shuttle service to allow for the quick and low cost transfer of containers to and from the port. Beira has suffered from congestion due to the large number of empty containers stored in the port – this could be shifted to a CFS. Dondo could be a suitable location for this; ideally the distance should be shorter.

- Expand Port Rail Sidings. The present container terminal rail sidings can handle one split train – 2 lines of 20 wagons. This is not a problem with the current low rail volumes, but will inhibit the development of a competitive rail intermodal service. Ideally, the siding should be able to handle a full train, but there are clearly space and layout constraints within the terminal. This will be addressed as part for the revised master plan
- Develop Truck Holding Area. This should be done urgently – a formal holding area with an established entrance procedure to the port. The facilities and procedures at Durban container terminal 'A' gate could be a useful model to consider. This should also be part of the master plan.

Road

- Improve Road Access to the Port. The port road access is unsatisfactory; ideally the access should be via a dedicated road which avoids built up areas. This is a common problem with virtually all ports, and the longer it is not dealt with, the more difficult it is to solve. Although outside the port area, it should be addressed by the master plan
- Rehabilitation of Dondo – Inchope road. This is long overdue, particularly with increasing road volumes of coal exports from Moatize (ANE)
- Shift Bulk to Rail. Consideration should be given to shift the Moatize coal export by road put onto rail at Nova Vanduzi on the Machipanda line, 234 km from Beira. This will require provision to be made on the receiving end, as the existing coal yard dedicated to Vale and Rio Tinto's rail operations
- Develop Truck Stops. This should be encouraged, but can best be handed by the private sector, as it is on the Durban Gauteng corridor. Possible locations could be Dondo and Inchope
- Plan OSBP for Forbes Machipanda. This does not appear to be critical at this stage, but should be planned for the medium term.

Rail

- Develop Seamless Service. In order for rail to be competitive with road, a consistent transit time of between 1 and 2 days will have to be guaranteed. This can only be realistically achieved if the Beira Harare rail freight service is operated as a seamless service with no stops for locomotive switches, train inspections, customs or immigration. Trains must be operated as scheduled block trains, a principle also now

being adopted for general freight in South Africa (TFR). This will require NRZ and CFM to grant reciprocal track access to each other on agreed trains and access tariffs.

- Corridor Access and Tariff agreement (business agreement). A new NRZ / CFM business agreement will be required, which will allow non-discriminatory access to each on the other's lines. Track access fees and rail tariffs should be agreed, using the same methods and formulae. A preliminary analysis has indicated that it should be possible to operate a service of 0.8 mtpa (0.5 in and 0.3 out) with a total tariff of less than US$ 40/t – (which is significantly cheaper than road), and with an attractive operating margin for both infrastructure and operations.
- Development of ICD's. This is an important part of intermodal railway service revival, with the ICDs acting as consolidation, distribution and warehousing centres. In order to promote the Beira Corridor in the Copper Belt, ICDs should be considered at Lions Den and Kafue, allowing the development of a multimodal service.
- Upgrade CFM Rail Section. Work has already been carried out by CFM, but additional upgrading will be required as traffic picks up, particularly in the steep sections near Machipanda.
- Repair NRZ Section. The line was recently inspected by the CPCS team as part of the NRZ recapitalisation study; some funds are needed to rectify deferred maintenance, to remove the speed restrictions.
- Double track between Dondo and Beira, which will start to become necessary when traffic levels start exceeding 12 to 15 trains per day in each direction. This will thus largely be dictated by the Moatize coal export volumes, and also the possible development of and ICD and /or an IDZ at Dondo. A 30km single line is too long for a frequent single line short train rail shuttle service.
- Price Regulation. If an agreement is made between CFM and NRZ on the methods to determine track access fees and rail operating tariffs, which need not be numerically the same, then there will have to be a monitoring and regulation mechanism.
- Rolling Stock Provision. Provision of reliable rolling stock on the Machipanda line as the demand increases, requiring flexible short lead time procurement with a high level of standardisation in fleet specification across the border. If the Machinpanda line is operated as a financially ring-fenced service by NRZ and CFM, then rolling stock provision could be through a leasing system with the owning railways, with either new or refurbished units from the current stock of stabled equipment. For the NRZ system, this is currently being investigated by a South African consortium consisting of DBSA, IDC, Thelo and PWC.
- Rail Master Plan - The basic principles of the railway master plan, as presented by the MTC at the Mozambique Transport Infrastructure 2013 conference, puts much emphasis on the development of a north-south railway, connecting the existing separate rail systems, rather than the shorter east – west rail lines. It is implied that road transport is more suited to distances of less than 500km. It seems clear that this is driving the favoured routing of the

proposed new Moatize export rail lines – these could be seen as the first phase of the NS rail system. However, railways can be made to operate very efficiently over distances of less than 100km, and new railways, such as the NS rail system, will require freight traffic volumes of more than 10 mtpa in the short to medium term in order to be financially and economically viable. The short Mozambique rail corridors extend more than 1000km into the SADC region. The basic principles of the railway master plan are perhaps the underlying reasons for the long delays in implementing rail and port solutions to meet the demand of Moatize coal exports.

Trade Facilitation

- The choice of the port of Beira as the prime port serving Zimbabwe, Zambia and southern DRC depends on the key criteria of price, time and reliability. The problems of congestion at the general cargo berths must be resolved, which will entail the development of a new high capacity coal terminal.
- The establishment of a seamless rail service on the Harare - Beira railway will improve price and performance competition.
- Customs procedures and documentation in the region needs to be harmonised with the new Mozambique single window system – the different systems need to be linked with effective communication.
- The Beira Corridor Group should be re-established, driven by the private sectors in Zimbabwe and Zambia, along similar lines to the MLCI on the Maputo Corridor.