CORRIDOR DIAGNOSTIC STUDY OF THE NORTHERN AND CENTRAL CORRIDORS OF EAST AFRICA

ACTION PLAN

Volume 2: Technical Papers

G. Rail Revitalization

SUBMITTED TO
Task Coordination Group (TCG)
Chaired by East African Community (EAC)
Alloys Mutabingwa
Deputy Secretary General Planning and Infrastructure
Arusha, Tanzania

SUBMITTED BY
Nathan Associates Inc.
Arlington, Virginia, USA

April 15, 2011

USAID Contract No. EEM-I-00-07-00009-00, Order No. 2
with funding provided by USAID and DFID

Contents

1. Introduction **1**

Background 1

Study Scope 1

Organization of this Technical Paper 3

2. Rail Revitalization Strategy **4**

Need for Rail Revitalization 4

Revitalization Strategy and Key Parameters 6

3. Revival of TRL System (Tanzania) **13**

Current Status 13

Revitalization Strategy for TRL 20

4. Revival of RVR System (Kenya and Uganda) **28**

Current Status 29

Revitalization Strategy for RVR 31

Illustrations

FIGURES

Figure 1. RVR and TRL Rail Systems, 2010 3
Figure 2. RVR Locomotive Failures January-August 2009 30

TABLES

Table 1. TRC Rail Age and Condition, 2004 13
Table 2. TRC/TRL Freight, 1993-2010 15
Table 3. TRL/RAHCO Key Performance Indicators for 4th JISR, 2010 15
Table 4. TRL Proposed Track Rehabilitation Works During Concession 16
Table 5. TRL Emergency Signal Repair Covering Sections between Dar es Salaam, Tabora, Mwanza and Kigoma 16
Table 6. TRL Requested Investment Schedule (US$ million) 17
Table 7. Scenario 1: Current TRL Operations with Traffic of 0.5mtpa, 17-day Turnaround and Tariff at 12.3 cents/ tkm 18
Table 8. Scenario 2: TRL Recovery to Traffic of 1.5 mtpa, 7-day Turnaround and Tariff at 5.8 cents/ tkm 18
Table 9. Scenario 3: TRL Recovery to Traffic of 2.0 mtpa, 7-day Turnaround and Tariff at 4.8 cents /tkm 19
Table 10. Costs to Procure and Retain TRL Management Team 21
Table 11. Costs for TRL Revival – Infrastructure and Rolling Stock (Initial 3 Years) 25
Table 12. Costs for TRL Revival Infrastructure Years 3-5 26
Table 13. RVR Traffic and Performance, 1989-2009 28
Table 14. Condition of Northern Corridor Railways Tracks 29
Table 15. Cost of RVR Infrastructure Upgrade – Years 1-3 33
Table 16. Cost of RVR Locomotive Rehabilitation – Years 1-3 34
Table 17. Cost of RVR Infrastructure Upgrade – Years 3-5 36
Table 18. Cost of Mombasa Intermodal Yard and Equipment 37
Table 19. Cost of Kampala ICD Development 38
Table 20. Cost of Reconstruction of the Tororo – Gulu – Pakwach Railway 39

Acronyms

BOL	bill of lading
CD	chart datum
CDS	Corridor Diagnostic Study
CFS	container freight stations
COFC	container on flat car
CY	container yard
DRC	Democratic Republic of Congo
EIR	equipment interchange report
GRT	gross register tonnage
ICD	inland container depots
KMA	Kenya Port Authority
km	kilometers
LoLo	lift on-lift off
m	meters
mtpa	million tons per annum
MCT	Mombasa Container Terminal
MHC	mobile harbor crane
MLL	Marine Logistics Ltd.
OCR	Optical Characteristic Reader
RA	Revenue Authorities
RAHCO	Reli Assets Holding Company
RFID	Radio Frequency Identification Device
RMG	rail mounted gantry
RoRo	roll on-roll off
RTG	rubber tire gantry
RS	Reachstackers
RVR	Rift Valley Railroads
STS	ship to shore
SUMATRA	Surface and Marine Transport Regulatory Authority
TICTS	Tanzania International Container Terminal Services
TAZARA	Tanzania-Zambia Railway Authority
TEU	twenty-foot equivalent unit
tkm	ton kilometer

TOFC	trailer on flat car
TOS	terminal operating system
TPA	Tanzania Port Authority
TRC	Tanzania Railroad Corporation
TRH	Tanzania Road Haulage
TRL	Tanzania Railroad Limited

1. Introduction

Background

The Northern Corridor anchored by the port of Mombasa in Kenya, and the Central Corridor, anchored by the port of Dar es Salaam in Tanzania, are principal and crucial transport routes for national, regional and international trade of the five East African Community (EAC) countries, namely; Burundi, Kenya, Rwanda, Tanzania and Uganda. Due to inadequate physical infrastructure and inefficiency, these corridors are characterized by long transit times and high cost. Freight costs per km are more than 50 percent higher than the USA and Europe and for the landlocked countries; transport costs can be as high as 75 percent of the value of exports. Modernization of transport infrastructure and removal of non-tariff barriers along these corridors is critical for trade expansion and economic growth, which are key to the success of regional integration as well as creation of wealth and poverty alleviation in the individual countries.

The Heads of State in the COMESA, EAC and SADC, the Tripartite, have determined that the transport inefficiencies are among the biggest impediments to realizing their vision to lead their countries out of poverty. Transport costs are prohibitively high and are a barrier to trade and investment, which are the cornerstone for the aspired economic growth to regional prosperity.

Having had the experience of successful development of an action plan to effectively tackle transport bottlenecks on the North-South Corridor, the Tripartite have ordered the preparation of a similar action plan for the key trade routes of Eastern Africa. As a technical foundation for the action plan, regional stakeholders in March 2009 agreed to carry out a Corridor Diagnostic Study (CDS) with funding from the U.S. Agency for International Development (USAID) and the U.K. Department for International Development (DFID).

Study Scope

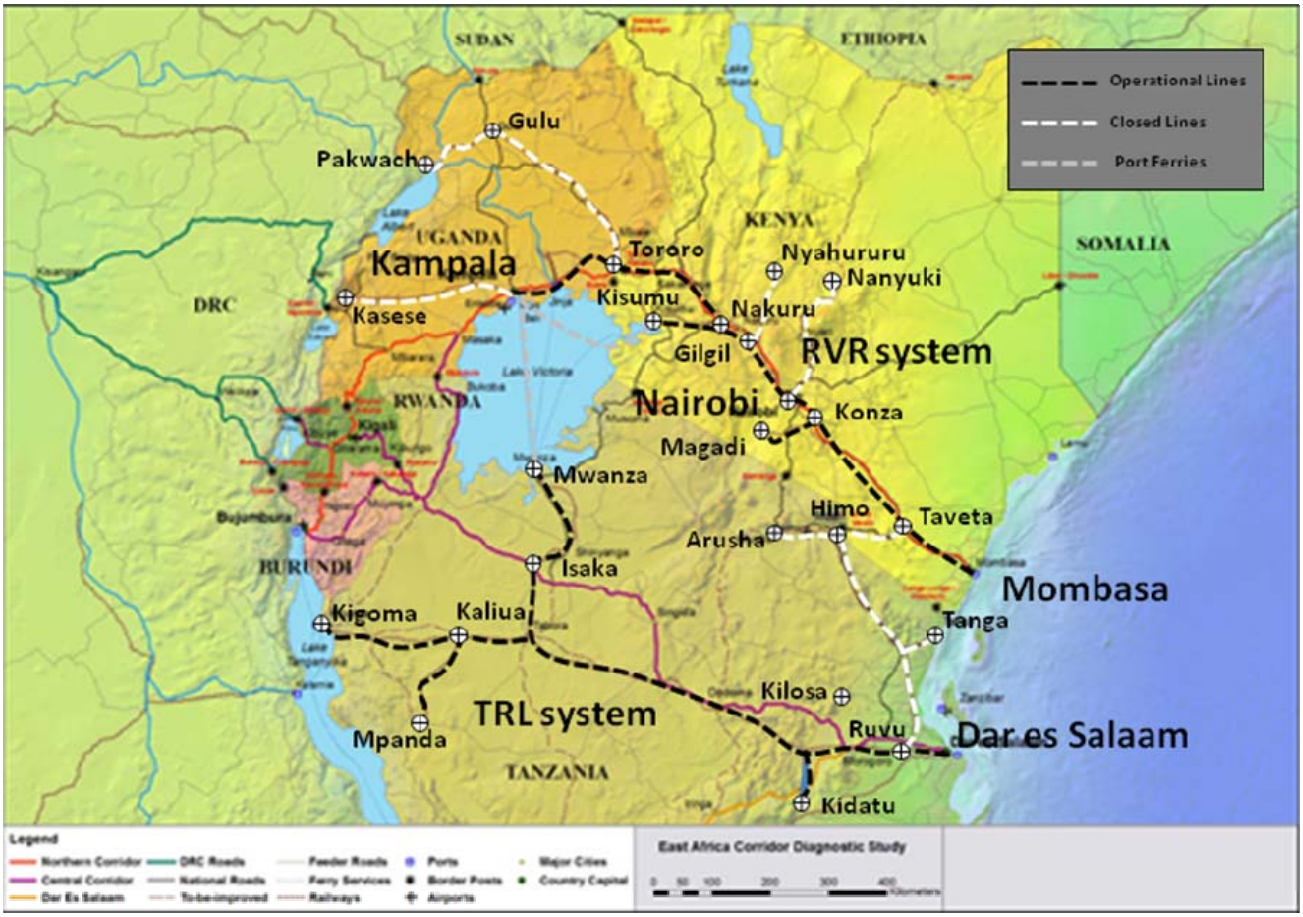
The focus of this Technical Paper is to put forward a strategy for the revitalization of the of the railway sector in the Northern and Central Corridor – the system currently operated by RVR in Kenya and Uganda and by TRL in Tanzania.

The current RVR and TRL rail systems in operation are shown in Figure 1. The Northern Corridor rail system operates within Kenya and Uganda as a narrow gauge (1,000 mm) system, compatible with the Tanzania Railway Limited (TRL) system on the central corridor in Tanzania. The line extends from the port of Mombasa to Nairobi, and further to Malaba, connecting to the Ugandan rail system serving Kampala and on to Kasese close to the DRC border. There are several spurs, the most important being the line to Kisumu on Lake Victoria, and the spur to Magadi Soda south of Nairobi. The rail link to Tanzania, from Voi in Kenya to Himo in Tanzania, is closed, because of low traffic demand. This is also the case for the line between Kampala and Kasese, and the northern Ugandan line from Tororo through Gulu to Pakwach on Lake Albert, which has a road /rail bridge across the Nile. The railway does not extend as far as Arua, although this is shown on some regional maps. Rebel activity is also partly responsible for closure of this line, which was built as recently as the 1960s.

The central corridor railway system, now operated as TRL, was originally built in 1907/14 to connect the port of Dar es Salaam with the Lake Tanganyika region – Congo, Burundi and Rwanda. The line from Taboro to Mwanza, to serve Uganda via Lake Victoria, was completed in 1928. Branch lines were completed to Mpanda in 1949, and to Kidatu in 1965. The whole TRL system was built to the 1000mm gauge standard with light 56 and 60lb/yard rail. Significant sections of the mainline still operate on the original track, and about 500km of rail date back to 1912. The track is gradually being upgraded with 80lb/yard rail. The mainline has remained an important economic lifeline, but operations were affected by the disruption of the rail ferry service on Lake Victoria in 2005, insecurity and civil strife in the Lake Tanganyika region that reducved traffic, and also the more recent flood damage on the Dar to Dodoma section in 2009/10. The Ugandan ferries are now being reruned to service and the flood damage has been repaired.

The railway from the port of Tanga to Moshi was built between 1899 and 1911, later extended to Arusha and linked to the Kenyan railway system at Voi in 1925. A link to the central corridor rail system was built in 1963, but after the concessioning process in 2007, the northern TRL system was closed due to low traffic volumes and difficulties with the concessioning process. There are now plans to reopen and revive the northern system, but this will depend on the future structure of TRL.

Figure 1. RVR and TRL Rail Systems, 2010



1

Source: Nathan Associates Inc.

Organization of this Technical Paper

Having presented the introduction to the recent difficulties experienced by the regional sector and the key objectives of any future intervention or investment in the rail sector, Section 2 presents a general performance overview of both systems, a description of the main factors which control and influence railway operations, setting out the generally accepted operating principles and criteria for successful railway performance. The operation of railways is a highly specialized business and the basic operating criteria are not always understood by decision makers – Section 2 effectively provides a layman's guide to the key railway operating and cost principles. Sections 3 and 4 of the working paper deals specifically with the operations of TRL and RVR respectively, and provides a more detailed operational analysis, followed by proposals for a development strategy and specific interventions.

2. Rail Revitalization Strategy

Need for Rail Revitalization

During the past 30 years, since the early 1980s, the performance of all the East Africa regional railway systems has declined, and with very few exceptions, operations have become loss making. Efforts to revive the regional railway sector in eastern and southern Africa through a process of private sector concessioning have generally not been successful.

Many of the regional railway systems, in eastern and southern Africa, are not functioning as they should, in virtually all respects – poor reliability, high accident and failure rates, high costs, low volumes and financially loss making. The reasons for this have been well debated and studied for many years and are also well understood – initial loss of volumes and income from road transport deregulation, followed by lack of investment and deferred maintenance, leading to declining reliability and further loss of traffic.

Privatisation of some of the railway systems through long term concessioning has generally not been successful in many cases due to a flawed process. The privatisation process took much longer than planned, during which time there were no provisions for funding, the agreements were generally weak and the choice of concessionaire was sometimes poor – there were no serious bidders with the appropriate skills and resources. In two instances, the South African Spoornet /TFR participated as the subcontracted operator, but withdrew after a short period (BBR / RSZ). Another major factor has been the absence of ongoing support by government, partly due to the inability to fund, and political interference which translated into poor management.

The current situation for several of the regional railway systems is that the traffic volumes and income has fallen below that required for sustainable operations. The income generated is first spent on salaries and fuel, with inadequate funds left over for maintenance and repair of both infrastructure and equipment. The budgets and performance indicators clearly show this. The railways thus continue to decline and lose customers, and are unable to attract the necessary funding required to return to competitive levels of reliability. Systems such as TRL, TAZARA, have estimated that they each require funding of the order of US$ 200 million in order to revive their operations – excluding provision for working capital. The TRL and TAZARA freight traffic levels are of the order of 0.5 mtpa, RVR in Kenya (a larger operation and customer base) is of the order of 1.5 mtpa – it has been estimated that traffic and income levels would have to increase threefold in order to achieve

financially viable and sustainable operations. In the current situation, the level of funding required to achieve this has not been available – not from governments, not from multinational finance institutions such as the WB, and not from the private sector (without guarantees being provided or some sort of trade or barter with minerals or oil). However, the recent entry of a new resourceful shareholder in RVR with a substantial management and investment commitment shows much promise.

The railway systems are thus continuing to decline, with the 'financing gap' becoming wider each year. However, the railways still serve an important economic function, and there are some ring-fenced successful operations – the closure of the systems is not yet an acceptable option. Spoornet in South Africa have recently had some success in turning around their general freight and intermodal operations and increasing freight volumes. This example shows that the best option is for the railway operators to prepare realistic and detailed business plans, focussed only on the core activities necessary to increase targeted bulk and intermodal freight volume increase. Detailed cash flow projections will have to be prepared, linked to performance targets and agreements/MOUs with key customers, showing the long term and short term financing requirements. Experienced management support will be necessary to prepare the business plans, to present the plans to potential funders and to implement them – it seems likely that donor support could be found for the cost of the initial management input.

Despite the generally negative prognosis, there is clearly a renewed interest in rail transportation through the region, with very many proposed new projects, and the general expectation from governments and institutions that the systems will now be revived, upgraded and expanded with increased private sector participation. The reasons for this renewed interest, particularly in respect of transport services on the Northern and Central Corridors of East Africa, is mainly driven by the following factors:

- Continued decline and poor state of the "old" railways, despite private sector concessioning, has lead to the belief by some regional governments and institutions that the regional railway system is obsolete and may not be adequate to support expected economic growth, and that the better solution would be to modernize the network to higher capacity and speed, at standard gauge.

- Increased heavy goods vehicle traffic on the roads, with consequent increased road maintenance costs, which cannot be afforded or sustained on many of the routes – except on some high volume routes which can be operated as toll roads.

- Rail can better handle empty backhaul, because of lower variable costs

- Rail is the natural mode for most large volumes of heavy bulk commodities, because of the ability to move heavy and large freight parcels

- A viable rail service is necessary to keep trucking competitive

- The shift of bulk imports to road exacerbates the imbalance in full truck flows, resulting in higher costs

- Efficient rail operations would facilitate competition between the two corridors for transit traffic, with more competitive pricing
- Improved rail transport is also key to resuscitating lake transport services
- The high cost of road transport compared to rail transport (assuming that the rail volumes are high enough to achieve an acceptable level of equipment and infrastructure utilisation)
- The increasing cost of fuel. Railway transportation is about four times more fuel efficient than road transportation, and as the fuel prices increase, rail will become increasingly competitive. There will be many more international oil crises, and it is estimated that by the year 2030, oil production will have fallen from their present levels with consequent substantial price increases – indicating a shift to more fuel efficient rail. This will be an increasingly important factor in future.
- Environmental factors – congestion, safety and emissions. These factors are becoming increasingly important, and are being controlled by commitments and legislation.

Revitalization Strategy and Key Parameters

The future development strategy for railways in eastern and southern Africa, (and in the world as a whole), will be governed by the need to further develop and upgrade existing systems and to invest in new systems, in order to minimise the overall effects of increasing oil prices and more stringent environmental targets. Despite the ongoing poor performance of the railway systems in Africa, there seems to be no other option than to work towards a revival and expansion of the railway services, with the lead taken by government commitment and investment in infrastructure, and to encourage and permit private sector participation in operations.

In simple terms, the regional railways will all have to increase their freight volumes substantially in order to become viable. The regional railways will need to target the container sector in order to achieve the required threshold volumes for financially sustainable operations – this will lead to increased competition with road. Focusing on bulk traffic will in most instances not be enough. Building new lines and linkages may not assist the situation, unless linked to specific contracted anchor projects (such as the possibility of the nickel mining sector in Tanzania and Burundi or the oil sector in Uganda). Prior to the 1980's, railways were partially protected in respect of volumes and tariffs charged – this is no longer the case unless there is market interference through governments. In most cases, for the railways to win back both bulk and intermodal (container) traffic from road they will require much improved reliability and associated investment.

In the sections below, we discuss some of the key parameters that will guide the successful revitalization of the regional railways.

OPERATING STANDARDS

On the question of operating standards and specifications, the decision by several of the regional institutions to support a shift to the more cost efficient international standard rail gauge of 1435 mm for all new construction, is clearly the correct long term vision. However, it is a question of timing, affordability and bankability, and results of economic cost benefit analyses. For new projects which can be operationally ring fenced, such as new high speed passenger commuter services, or dedicated bulk freight lines, the adoption of standard gauge seems logical. In respect of locomotive traction, diesel electric will likely remain the most favoured, but with electrical traction gradually gaining ground – electrical traction means higher fixed cost, but lower operating costs, and therefore requires higher threshold volumes to be financially viable. The enormous investment required to upgrade the relatively low volume existing systems to standard gauge is likely to dictate that this be done in a phased manner depending on demand – this implies that the existing systems should be revived first to provide the base business case.

COSTING AND PERFORMANCE

In trying to find the appropriate solutions for the revival of the regional railways, it is useful to understand the basic cost structure of railway versus road. For road services, fixed costs make up about 40 percent of operating costs, with most of the variable costs being fuel. The fixed costs for railway operations generally vary between 60 percent and 80 percent, mostly depending on the freight volumes and related asset utilisation. Highly efficient heavy haul railway have a lower percentage fixed cost. This is why it is important for rail to achieve a very high level of infrastructure and equipment utilisation.

For example, on the Coal line in South Africa, the freight volume is about 60mtpa, train turnaround time about two days over a distance of 540 km, tariff about US$ 0.015 per tkm and the operation is very profitable. In contrast, on TRL in Tanzania the volume is 0.5mtpa, the train turn around time is 17 days or more over a distance of 1200km (should be seven days), the tariff is US$ 0.065 per tkm, and the operation is severely loss making. A typical railway freight tariff for an efficient general freight service would be about US$ 0.04 per tkm, which would be less than the road tariff for a full return haul. An operational model has indicated that if TRL was able to reduce the turnaround time to seven days, increase traffic to 1.5 mtpa (the previous level as recently as 2003), tariffs could be reduced to less than US$ 0.05 per tkm, achieving a operating margin of 12 percent, after servicing of a US$ 105 loan at 8 percent pa over 10 years. This could be the basis for a revival scenario.

OPERATING SPEED

There has been a strong push for new standard gauge railway systems for, among other reasons, the need to increase the operating speed from the current about 30 km/hr to a speed of 120 km/hr (and to improve reliability and safety), at a staggering cost of US$ 2 and 4 billion for Tanzania and Kenya respectively. The current transit time on RVR from Mombasa to Kampala is about 10 days, sometimes much higher. The actual train travelling time at 20 km/hr average speed, is 2.5 days. This means that the train is effectively standing still for 7.5 days, due to scheduling, breakdowns, derailments. If a 2.5 day guaranteed transit time is offered to

customers, with a competitive tariff, then RVR would capture virtually all the road traffic. The first priority for the railways is therefore to make to operations safe for a given speed restriction, say 20 or 30 km/hr, and to avoid the breakdown of equipment. Properly maintained equipment hardly ever suffers breakdowns – the main problem is deferred maintenance, and the equipment is therefore used until it breaks down. For rail passenger services, a scheduled high speed operating speed is important, but less so for freight – increasing the operating speed requires major new investment.

RAILWAY EQUIPMENT – SELECTION AND COSTS

The locomotives operating on the regional narrow gauge systems, 1,000 mm and 1,067 mm gauges, are generally between 2,000 hp and 3,000 hp, weighing 90 ton to 120 ton, with 15 ton to 20 ton axle loads. The TRL and Uganda RVR systems operate much smaller (1,200 hp) mainline locomotives, but the objective will be to gradually replace these with larger locomotives as the rails tracks are upgraded. The locomotives are almost all American or Canadian GE or GM units, which cost of the order of US$ 3 million new. Remanufactured units can be purchased for about half the new price. (Riversdale Mining in Mozambique has recently placed an order for 11 new/remanufactured +2,000 hp locomotives, of the GM/GE 'African workhorse' type from the USA, for US$ 2.1 million each). New locomotives have been supplied from China for about US$1mill, but there have been some quality problems – GE has now established a manufacturing plant in China. On the larger railway systems it is common practice to cascade the locomotives from high volume operations to lower volume general freight operations, such as those on the Northern and Central Corridor systems – it is often difficult to justify the high cost of a new locomotive for general freight operations. New locomotives are not purchased 'off the shelf' – they are manufactured to specification on order. Locomotives are often given a 'book life' of 25 years which can imply that locomotives that are older than 25 year are considered to be obsolete. This is not the case, because they can in most cases be economically overhauled and upgraded beyond the age of 50 years. A well maintained 25 year mainline locomotive can have an income generating capacity of more than US$ 350,000 per annum. All the regional railway workshops have the necessary skills and facilities to maintain and overhaul these locomotives.

Similarly, railway wagons can be overhauled, modified and in many cases converted for alternative use, using relatively simple skills and technology. The main service items are wheel, bearings and brakes. New wagons can cost from about US$ 50,000 for a container wagon to 3 to 4 times more for specialized wagons such as fuel or cement tankers. New wagons are also purchased on order – regional wagon manufacturing facilities and capabilities exist in South Africa, Zimbabwe and Mozambique, but due to declining demand over many years, fabrication is not on a continuous basis. Similarly, railway wagons often have a serviceable life of more than 50 years

THRESHOLD TRAFFIC VOLUMES

A very preliminary analysis has indicated that existing systems such as TRL and TAZARA require minimum freight volumes of about 1.5 mtpa to be financially viable, taking into account that the initial capital cost of

most or all of the existing infrastructure has been written off. It is likely to be similar for Zambia and more than 2 mtpa for Kenya, and probably about 7 mtpa for NRZ in Zimbabwe, a much bigger operation.

For new railways, the minimum traffic volumes should be more than 10 mtpa, and more than 20 mtpa for high speed heavy haul lines. For the Moatize coal project, Vale has been faced with the construction of about 200km of new line, upgrading of about 800 km to carry 12 mtpa over a distance of 1000 km – Vale found that higher volumes are needed for financial viability. Spoornet / TFR says that new lines are not viable below 20 mtpa. In the BNSF fesibility study for modernizing the Dar es Salaam – Isaka railway and building new extensions to Burundi and Rwanda, estimates of 1.5 mtpa (2012), 5.3 mtpa (2016), 11.0 mtpa (2021), 17.9 mtpa (2026) and 22.3 mtpa (2031) were assumed for profitability.

Many of the regional lines carry less than 1 train per day, often 20 wagons or less. It is estimated that at least 3 trains per day in each direction, with longer trains, would be required for a viable operation. This would equate to 30 wagons x 40 ton x 3 x 365 days = 1.6 mtpa, assuming a 20 percent return load. The Johannesburg – Durban general freight line carries more than 50 trains per day in each direction, about 20 of which are intermodal. TFR has struggled to make this general freight line profitable.

INDICATIVE CAPITAL COSTS FOR TRACK

The main reasons for choosing the narrow gauge of either 1,000mm or 1,067mm (3ft 6 inches), and the use of light rail for the original railway construction during the colonial period, was lower cost associated with relatively low traffic volumes. A narrow gauge can negotiate sharper curves than the standard gauge, and this was very important in difficult and mountainous topography. However, narrow gauge and sharp curves also means slower operating speeds and grater wear on locomotive wheels and rails, and hence the need for more frequent maintenance, and reduced reliability/safety. The expensive elements of maintenance most often involve the replacement of locomotive and wagon wheels and the replacement of rails on curves. The upgrading of track from the original colonial specifications, to allow faster speeds and increased capacity, will most often involve installing heavier rails on concrete sleepers (instead of wood or steel), realignment of areas with sharp curves (which often leads to lengthening of the line), strengthening of bridges to carry heavier axle loads, and to lengthen passing loops to permit longer trains – also additional passing loops to allow for more frequent trains.

Cost estimates for various types of railway works are based on the following examples:

- Complete upgrade with new sleepers and rails to 20-ton axle load, $400,000 to $500,000/km (ref. Sena line rehab, on existing alignment)

- New track with new formation and structures, 1,067 mm gauge, US$ 1 million to US$ 1.5 million/km, more for heavy haul high speed, up to US$ 2.5 mill.

(Spoornet/TFR heavy haul, US$ 2.5 million/km)

- The September 2009 BNSF study on the 960km Dar es salaam to Isaka railway, estimated US$ 940,000/km for an upgrade of the existing line with new rails and sleepers to accept a third standard gauge rail, on the existing alignment, US$ 1.03 mill/km for a dual gauge gauge on the same alignment, and US$ 2.57 mill/km for a new parallel standard gauge railway (new formation and structures) All costs included formation, structures and signalling.

- The June 2009 DBI study on the new proposed standard gauge Isaka to Kigali railway, including the link to Burundi, a total length of 692km, was estimated at US$ 4.0 mill/km, all inclusive including signalling and structures. However, two thirds of the line was located in mountainous terrain and structures accounted for 40% of the total costs, indicating that the costs were comparable to the BNSF costs for the more favourable topography on the Dar – Isaka section.

The unit costs for new railway construction, or the upgrade of existing systems, are clearly highly dependent on firstly, the performance specification; secondly, the degree to which the exsiting infrastructure can be reused; and thirdly, the topography.

-

FINANCING

Because of the relatively low volumes of freight carried on all the regional railway systems, with the exception of the high volume TFR lines in South Africa, the income generated is not enough to cover the cost of track and equipment maintenance – additional funding from the conceding authority will be necessary (central government in most cases). Therefore, it is unlikely that the concessionaires will be willing or able to fund major upgrades of track infrastructure, unless it is part of the initial funding package. The initial planned investment from government to pay for rectifying deferred maintenance and upgrades have often been based on the loan repayments being serviced by the concession payments, which in many cases have not materialised, and hence the funding has been held back. If the concessionaire cannot see how his investment will be returned, irrespective of what the agreement says, he will also stop funding. If one party is deemed to be in default, then the other party will withhold payment – this 'atmosphere of conflict' can carry on for many years.

Because of the very high capital costs of new track, the financial viability is very dependent on the loan interest rates – less than 5 percent per year is generally required for financial viability, unless the railway investment is linked to a major anchor project.

RAIL GAUGE

The decision has been made by the AU and regional governments (policy adopted) that all new railway projects should be built to standard gauge specifications. This is a perfectly logical approach, assuming that the

new projects can be ring fenced and can be shown to be economically/financially viable – this would normally be based on committed or guaranteed traffic volumes and income streams, rather than speculative projections. The new lines will be implemented when they are shown to be bankable, whether they are standard gauge or not. It has been proposed that rehabilitation of the existing track could be done to standard gauge specifications where the track formation permits – allowing for a third rail to be installed in a progressive manner, and possibly permitting the simultaneous operation of both the narrow gauge and standard gauge systems. It is assumed that such rehabilitation would include improvement of some structures, volume of track ballast and spacing and specification of sleepers to cater for higher axle loads than at present. However, the standard gauge specifications of higher speeds and axle loads will require the new track to be realigned in areas of difficult topography, and, depending on the length of such sections on a line, it may be more practical to build the whole line on a new alignment.

The older railway lines which still exist on the TRL system in Tanzania and the RVR system in Uganda – and parts of Kenya – consisted of 30 kg/m track and 1,000 mm gauge. Furthermore, there are significant sections, especially on the RVR system in Uganda and Kenya with sharp curves and difficult topography. The weak sections on both RVR and TRL systems allowed up to 15 ton axle loads with train lengths of about 30 wagons, wagon having a payload of about 43t each. The locomotives used are generally 1,200 hp to 1,500 hp, weighing up to 90 ton on 6 axles. The Kenyan mainline (RVR) has used 40 kg/m track, allowing up to 18.5 ton axle loads and a wagon payload of up to 60t, and larger 2,600 hp locomotives. Progressive upgrades on the TRL system have seen gradual replacement of the old 30 kg/m rail with 40 kg/m rail, but the process is far from complete. Ideally, the aim should be to increase the axle loads to 20.5 ton, allowing for increased payloads and larger locomotives – 3,000 hp, 120 ton. On poor sections of the existing track especially on RVR in Uganda, train lengths are limited to 10 wagons, and operating speeds to 10 km/hr. As a general rule, but depending on the track topography and locomotive horse power, one locomotive is required for each 20 wagons. Train lengths for vacuum braked wagons are limited to 40 wagons, but also subject to the length of the passing loops. All the mainline tracks on both TRL and RVR are single track with passing loops.

The standard gauge specification will allow for axle loads of more than 30 ton, payloads of more the 100t per wagon, and locomotives of more than 6,000 hp – longer trains, higher speeds, improved safety and higher economies of scale where there is adequate traffic volume.

CAPACITY

All the regional railway systems are operating at well below their original 'design capacities', but are currently suffering severe capacity constraints because of poor track condition, poor locomotive and wagon availability (many units stabled). In other words, the railway systems are not able to handle more traffic without substantial investment in the repair and upgrading of track and equipment, and the provision of working capital. For example, the theoretical design capacity of TAZARA is 5 mtpa, but the current throughput is about 0.5 mtpa.

MODAL INTERFACES

The efficient performance of rail is very dependent on the equally efficient operation of the modal interfaces, particularly rail – port and also the rail – road inland terminals and ICDs. Ideally, for intermodal train services, when each train carries containers belonging to many customers, a scheduled rail service should be operated on a block train principle, with both the port and inland terminal being able to handle the full length of the train without the need for train splitting and shunting. This will allow for fast loading and unloading, and a fast train wagon or train dwell time at the end terminals. Trains carrying bulk commodities, mostly belonging to a single customer, are scheduled according to demand. There should be a performance based contractual arrangement between the different modal operators at the terminals to allow for a seamless multimodal system to be operated – very important for rail because to lack of flexibility of the service. Inland depots and freight stations (ICDs and CFSs) should be both road and rail serviced.

3. Revival of TRL System (Tanzania)

Current Status

TRL is currently in an interim stage, in transition between cessation of the concession agreement and new management through RAHCO, with TRL staff salaries being guaranteed by government, but TRL being responsible for all other operating costs. RAHCO has sought financial support through government for a total investment of US$ 330 million in track repair and upgrades in the first five years. There appears to be no possibility for funding future TRL operations without the preparation of a detailed, realistic and credible business plan, which is focused on core business, linked to increasing freight traffic volumes. At the present time, TRL is unable to serve major new customers without additional up front funding to improve the performance of both infrastructure and equipment.

- Concession has been cancelled, previous capital budget for reconstruction is no longer available – the concession specified investment of US$ 250 million over 25 years. No provision for alternative funding has been made by government.
- TRL operations effectively taken over by RAHCO, with salary guarantees by government.
- The then Ministry of Infrastructure Development, now Ministry of Transport, may have to invite proposals for an interim management team to prepare a TRL business plan.
- The business plan will provide the basis for a restructuring model and financing package
- Interest has been shown by potential third party operators for access to the TRL lines.

TRL TRACK

The TRL 1,000 mm gauge system connection the port of Dar es Salaam with the Great Lakes region, has traditionally performed relatively well, providing a strategic service with a captive market, and freight volumes of the order of 1.5 mtpa. Volumes declined with the effective suspension of the Lake Victoria rail ferry service in 2004 (due to an accident and withdrawal of the operating permit) and unreliable and much reduced services to Kigoma on Lake Tanganyika.

The TRC system was concessioned in 2007 to TRL, a joint venture company between Rites of India (51 percent shares – as strategic partner with management responsibility) and Government (49 percent shares). From the outset, the concession was operated in an atmosphere of conflict with very little trust from either side. This led to the withholding of key investment funds and working capital, further exacerbating the situation, and ultimately to the cancellation of the concession in 2010, although financial closure is still outstanding. The operation of TRL is in the process of transferring to government through RAHCO, but there is no alternative arrangement for new investment or for the provision of working capital necessary for revival.

Table 1. TRC Rail Age and Condition, 2004

Section	From	To	km	Weight of Rail (Pounds/yard	Length Welded)	Year Installed	Age of Rail (2004)	Condition of Installation
Dar - Kigoma	0	20	20	60	20	965	39	New
	20	42	22	80	22	2002	2	New
	42	305	263	60	131		39	New
	305	310	5	80	5	1995	9	New
	310	424	114	80	114	1985	19	New
	424	530	106	80	106	1998	6	New
	530	546	16	60	16	1992	12	New
	546	624	78	80	78	1995	9	New
	624	730	106	56	0	1912	92	New
	730	835	75	80	80	1999	5	New
	805	1252	447	56	0	1913	91	New
Tabora-Mwanza	0	376	376	60	376	1972	32	New
	376	379	3	45	0	1928	76	New
Kidatu Line	0	70	70	55	0	1960	92	S'hand 1912
	70	108	38	50	0	1965	91	S'hand 1913
Mpanda Line	0	30	30	56	0	1912	92	New
	30	120	90	45	0	1949	92	S'hand 1912
	120	210	90	55	0	1945	59	New
Link Line Mruazi-Ruvu	0	72	72	60	0	1963	41	New
	72	107	35	80	35	1986	18	New
	107	116	9	56	9	1963	92	S'hand 1912
	116	145	29	60	28	1963	41	New
	145	188	43	55	43	1963	92	S'hand 1912
Tanga Line	0	352	252	60	0	1963	41	New
Arusha line	0	86	86	45	0	1929	75	New
Kalhe Line	0	18	18	50	0	1924	80	New
Singida Line	0	43	43	55	0	1912	92	S'hand 1912
	43	115	72	56	0	1984	92	S'hand 1912

Source: TRC.

The TRL railway infrastructure from Dar es Salaam to Kigoma, via Tabora was built in 1912-1913, using very light rail – 56 lbs/yard, about 28 kg/meter, with a 14 ton allowable axle load. This has gradually been replaced in sections, mainly with 80 lb/yard rails, generally allowing 18 ton axle loads. The TRL rail schedule shows that, immediately prior to concessioning, the main line specifications were as follows:

- Section between Dar es Salaam and Tabora consists of 56 lb/yd rail (106 km mostly 98 years old), 60 lb/yard rail (300 km mostly 45 years old) and 80 lb/yd (400 km mostly 10 – 25 years old)
- Section from Tabora to Mwanza, total distance of 379 km, all of which consist of 60 lb/yard rail, 38 years old
- Section from Tabora to Kigoma, total distance of 411 km, all of which consist of 56 lb/yard rail, 97 years old

The TRL concession agreement required a progressive replacement of all the light rail with new 80 lb/yard rail, commencing with 328 km on the Dar – Tabora section to be completed within the first five years (by 2012). Some of these rails were delivered during the concession period, but the upgrading was not carried out because of lack of funds. The project has now stalled. The concession agreement required that all the mainlines be upgraded to 80 lb/yard rail by the end of the concession period (2022). The first priority is to utilise the rails which have already been delivered. This process should be incorporated into the business and financing plan.

TRL FREIGHT VOLUMES

Table 2 shows the freight volumes carried by TRC/TRL from 1993 through 2010. TRC was carrying close to 1.5 mtpa in 2002-2003, despite the operating constraints of poor track and equipment – during 2003, TRC had 127 derailments and 5 collisions. After 2005, TRC shows marked decline in traffic volumes. The period 2005/6 is also the commencement of the concessioning process, which is often delayed and accompanied by a lack of motivation by the senior staff, because of uncertainty of their future positions. It can also be seen that the average freight haul distance reduced after 2005-2006, indicating a loss of transit traffic by TRC – the average transit haul distance is between 1,200 km and 1,250 km. There was also significant increase in railway freight tariffs during 2009-2010, presumably to optimise income in relation to the limited capacity. The current bulk tariff of US$ 0.063 per tkm would have difficulty competing with a full return load tariff by road.

Table 2. TRC/TRL Freight, 1993-2010

Year	Freight mtpa	Freight (million Tkm)	Avg. Haul Distance (km)	Avg Freight Tariff (USc/tkm)
1993	1.205			
1994	1.234			
1995	1.342			
1996	1.244			
1997	1.073			
1998	0.955	825	864	
1999	1.127	1,350	1,197	
2000	1.165	1,400	1,201	3.0
2001	1.351	1,600	1,184	
2002	1.446	1,700	1,175	
2003	1.443	1,480	1,025	
2004	n/a	1,200		
2005	1000	1,000	1,000	
2006	n/a	650		
2007	0.545	477	875	
2008	0.504	506	937	
2009	0.453	505	906	4.7
2010	0.200	n/a		6.3

Source: RAHCO/TRL and Eastern Africa Transport Sector Scoping Study, June1999

PERFORMANCE INDICATORS

The performance indicators presented by RAHCO/TRL at the 4th JISR in Dar es Salaam in September 2010, showed dramatic decline in TRL performance during 2010 (Table 3). This was mainly due to the major flood damage which occurred on the main line about 300 km from Dar es Salaam, which effectively suspended most of the services for the first half of 2010. Despite the average recorded locomotive availability of about 70 percent, the actual utilization, is typically less than 35 percent, and in 2010 below 20 percent. In other words, the very expensive equipment was standing still for most of the time. This is also reflected in the very high wagon turnaround time of 22 days for 2010. It would not be possible to operate a profitable railway business on this basis.

Table 3. TRL/RAHCO Key Performance Indicators for 4th JISR, 2010

S/No	Indicator	Unit	Target 2009	Actual 2009	Target 2010	Actual 2010 (March)
1	Total Freight Traffic	ton-km (Mil)	500.0	505.3	600.0	36.7
2	Total Passenger Traffic	p-km (Mil)	439.7	374,12	562.7	6.3
3	Avg Locomotive Utilization	km/loco/day	460.0	234	460	107
4	Wagon Turn round Time	days	13.0	17.8	12.0	22.7
5	Track speed restriction	km	0	125.2	0	125.2
6	Total Revenue (Freight)	Tshs (Billion)	35.5	35.2	43.2	2.8
7	Total Revenue (Passengers)	Tshs (Billion)	5.5	7.9	7.0	1.8
8	Total Operating costs	Tshs (Billion)	42.5	68.7	52.7	12.4
9	Capital Expenditure	Tshs (Billion)	93.1	26,4	93.157	24.0

Source: TRL/RAHCO

TRL Investment Requirements

TRL CONCESSION

The TRL concession specifies the following track rehabilitation schedule for the initial 5 year period, Ref RAHCO presentation, 4th JSIR, October 2010. However, "due to the prevailing circumstances surrounding the concession, it is most unlikely that this rehabilitation program will be implemented". The new business plan for TRL will have to reassess the priorities for track rehabilitation in conjunction with the marketing plan and will have to re-motivate the infrastructure funding.

Table 4. TRL Proposed Track Rehabilitation Works During Concession

Section	From (km)	To (km)	Distance (km)	Source of Funds	Target Date of Completion
Kintiku - Makutopora	530	546	16	IDA Grant	Target was Dec, 2008 not yet
Itigi - Malongwe	625	730	105	IDA Grant	Dec, 2010
Igalula -Tabora	803	840	37	IDA Grant	Dec, 2010
Sub - Total			**158**		
DSM-Mikese	0	173	173	IDA (22 km), and GoT	Dec, 2012
Grand Total			**331**		

Source:RAHCO, 4th JISR, 2010

Table 5. TRL Emergency Signal Repair Covering Sections between Dar es Salaam, Tabora, Mwanza and Kigoma

Description of Work	Section	Cost (US$ 000s)	Status
Provision of VHF (station to station and station to locomotive)	TBR–KGM & TBR MZA	700	Completed in Dec. 2008
Rehabilitation of Token Block Instruments and Signaling system	Ngerengere- Tabora	125	Planned completion date was March 2009. Not completed due to lack of funds.
Provision of Semaphore signals and Hand lever points in lieu of defunct Panel Interlocking	Ngerengere - DSM	12	Planned completion date was March 2009. Not completed due to lack of funds.

Source: RAHCO, 4th JISR, 2010

Table 6. TRL Requested Investment Schedule (US$ million)

Particulars	Year 1	Year 2	Year 3
Locomotives	22.80	27.70	40.10
Wagons	15.51	10.11	58.23
Coaches	3.50	1.05	-
Others Machinery and Plant	12.30	15.0	3.20
Track	47.25	5.85	36.85
P/W Equipments	6.69	1.16	2.72
Signal and Telecoms	1.0	-	1.00
Total	**107.49**	**60.51**	**140.54**

Source: GoT Task Force - TRL Draft Business Plan, 2010

The infrastructure funding requested by RAHCO/TRL for the first 3 years of operation totals US$ 132 mill, excluding locomotives, rolling stock and working capital. This will be reassessed in the new business plan, expected to cover the first 2 years of TRL revival, before a new operator is appointed.

TRL INVESTMENT AND OPERATING SCENARIOS

A preliminary analysis has been carried out in order to determine the possible outcome of various operating scenarios for TRL, for a given capital investment in infrastructure and working capital provision of US$ 103 mill. Locomotives and wagons are provided on a daily lease basis, therefore the availability of equipment is assumed to be 100 percent and the utilization is reflected in the given train turnaround times, with an ultimate target of seven days. The capital loan is assumed to be 8 percent per annum over 10 years. The analysis is done on a 'steady state' basis, and is not time related.

Scenario 1 confirms that the TRL cannot be operated as sustainable business without a significant improvement in equipment utilization and traffic volumes. This scenario assumes that the infrastructure and working capital investment is made, but that there is no significant improvement in performance and hence no increase in traffic volumes or income from freight services. This could be a realistic scenario if the investment is made without improved or new management.

Scenario 2 indicates that that the TRL rail service could be made to be competitive with road services, on the basis of a 7 day train turnaround and traffic volumes of at least as much as those previously achieved in 2004, of about 1.5 mtpa. The investment of US$ 103 million is focused on making the track safe for the specified speed restrictions – i.e., a significant reduction in derailments should result in improved reliability. Improved management and also improved equipment availability and utilization are key elements for success. The provision of locomotives and wagons is based on a daily lease arrangement, either on a PPP basis or through a separate internal cost centre, which should provide an incentive for much improved utilization.

Scenario 3 shows the effect of increased freight traffic volumes and income, with a profitable operation able to motivate additional infrastructure investment. Since the previous higher volume of about 1.5 mtpa in 2003,

overall freight traffic volumes have increased and TRL would be expected to pick up some of the additional growth. In order to achieve this, TRL would have to become directly competitive with road service for intermodal transit traffic. This will demand highly efficient rail terminal operations.

Table 7. Scenario 1: Current TRL Operations with Traffic of 0.5 mtpa, 17-day Turnaround and Tariff at 12.3 cents/ tkm

Rail Tariff Breakdown	US$ million	USCents/tkm	Percentage
Capex Loan	15.350	3.07	25.0
	0.000	0.00	0.0
Loco Lease	16.321	3.26	26.6
Wagon Lease	5.875	1.18	9.6
Shunter Lease	3.066	0.61	5.0
Fuel Cost	5.280	1.06	8.6
Track Maintenance	8.500	1.70	13.9
Signaling Maint/Ops	2.550	0.51	4.2
Train Ops	0.519	0.10	0.8
Insurance	2.075	0.41	3.4
Administration	1.786	0.36	2.9
Variable Concession Fee	0.000	0.00	0.0
Operating Margin	0.000	0.00	0.0
Total Average Income and Tariff	61.324	12.3	100.0

Source: Nathan Associates Inc.

Note: Average tariff too high – max should be 6.3US cents/tkm. Loss making operation.

Table 8. Scenario 2: TRL Recovery to Traffic of 1.5 mtpa, 7-day Turnaround and Tariff at 5.8 cents/ tkm

Rail Tariff Breakdown	US$ million	USCents/tkm	Percentage
Capex Loan	15.350	1.02	17.7
	0.000	0.00	0.0
Loco Lease	19.732	1.32	22.7
Wagon Lease	7.106	0.47	8.2
Shunter Lease	3.066	0.20	3.5
Fuel Cost	15.840	1.056	18.2
Track Maintenance	8.500	0.57	9.8
Signaling Maint/Ops	2.550	0.17	2.9
Train Ops	0.642	0.04	0.7
Insurance	2.509	0.17	2.9
Administration	2.259	0.15	2.6
Variable Concession Fee	0.000	0.00	0.0
Operating Margin	9.306	0.62	10.7
Total Average Income and Tariff	86.857	5.80	100.0

Source: Nathan Associates Inc.

Note: Average tariff acceptable and competitive with road transport, operating margin is 12 percent.

Table 9. Scenario 3: TRL Recovery to Traffic of 2.0 mtpa, 7-day Turnaround and Tariff at 4.8 cents /tkm

Rail Tariff Breakdown	US$ million	USCents/tkm	Percentage
Capex Loan	15.350	0.77	16.1
	0.000	0.00	0.0
Loco Lease	19.732	0.99	20.7
Wagon Lease	7.104	0.36	7.5
Shunter Lease	3.066	0.15	3.2
Fuel Cost	15.840	0.79	16.6
Track Maintenance	10.200	0.51	10.7
Signaling Maint/Ops	2.550	0.13	2.7
Train Ops	0.642	0.03	0.7
Insurance	2.508	0.13	2.6
Administration	2.308	0.12	2.4
Variable Concession Fee	0.000	0.00	0.0
Operating Margin	15.860	0.79	16.7
Total Average Income and Tariff	95.162	4.8	100

Source: Nathan Associates Inc.

Note: Average tariff competitive, operating margin is 20 percent.

Revitalization Strategy for TRL

It is proposed that donor funding be sought for the appointment of a new experienced management team, which should prepare a realistic business plan, based on core business, to serve as a basis for refinancing of TRL. It is estimated that investment of the order of US$ 110 million will be needed, excluding rolling stock, but including working capital. The TRL service remains critical for serving the eastern DRC, Rwanda, Burundi, and to a lesser extent Uganda, both in respect of international and regional trade. Given the recent experience, the possibility of a new railway concession in the immediate term is not appealing. The Kenya railway operator, RVR, through its new shareholder Citadel, has expressed an interest to operate its own trains on the TRL system, and Burundi logistics companies have expressed the same interest, if the TRL line can be extended into Burundi territory. TRL will have to target the intermodal freight sector in order to achieve the minimum freight volume required for financial viability.

Priority investments to improve infrastructure in support of TRL revival plan include:

- Enhance capacity by replacing light rails with heavier sleepers and rails of 80 lb/yard and rehabilitating bridges to at least 25 axle load capacity.

- Rehabilitation of track especially between Kilosa and Gulwe stations i.e. bridges to at least 25 t axle load capacity (area of recent washaway).

- Rehabilitation of rolling stock
- Lease rolling stock.
- Construction of inland container terminals at Ilala (Dar es Salaam), Shinyanga (Isaka) and Mwanza in order to assist decongestion of containers at the port of Dar es Salaam.

The following key projects have been proposed to effect a revitalisation of the TRL railway services, with the initial objective of recapturing the previous higher volumes of freight carried up to 2004. Other related projects include the development of a rail serviced Cargo Freight Station outside Dar es Salaam, improved rail access to the port container terminals and the development of inland intermodal rail freight terminals, in the first instance at Isaka.

1. PROCURE AND RETAIN TRL MANAGEMENT TEAM – 2 YEARS

Background/Rationale

The Tanzania Railways Limited (TRL) serves the land locked countries of Uganda, Rwanda, Burundi and parts of eastern DRC. Traditionally the system carried between 1.2 mtpa and 1.5 mtpa, but in the past six years traffic has fallen to below 0.5 mtpa due to a series of specific events: (i) lack of investment and poor performance of the railways over the period, (ii) the suspension of the Ugandan rail ferry service; (iii) the 2009 flood damage, causing a six month service suspension, and (iv) the failure of the concession with Rites, operating as TRL. The TRL service is particularly critical for Burundi, because it previously carried all Burundi's international trade, which is now routed via a much longer and more expensive road route. The same applies to trade with the eastern DRC through the lake ports of Kigoma and Kalemie.

The TRL service also provides the shortest distance to any port from Rwanda, and the decline of the lake and rail service has resulted in Rwandan transit traffic being shifted from the Central to the Northern Corridor, at additional cost. As a result of the failed concession, the budget allocated for the revival of the system is no longer available. Urgent outside assistance is needed. However, there appears to be little possibility to attract such financial support without ensuring that there are sufficient conditions to ensure value for money. One of the key conditions is a good business plan and a fully experienced and accountable management to implement the plan. Such a management is likely to be a combination of local experts, supported by an experienced and well technically resourced team from a reputable international railway company, with experience of turning around railways and managing successful or profitable railways.

Description/ Major Components

Phase 1: Preparation of the TOR for a performance based management contract, working jointly with The MOID and RAHCO, motivation of funding for the management contract (estimated at US$2 million over two years), preparation of tendering process, prequalification, adjudication, preparation of management contract and appointment of management contractor. Technical assistance required, assumed funded by RAHCO with indicated WB support.

Phase 2: Retain TRL management team for a period of two years, management the operation of TRL, prepare detailed business plans, including cash flows and financing schedule, presentation of business plan to secure funding, prepare and implement marketing plan to target intermodal sector and increase freight levels. Study option for future operational structure for TRL and prepare contracts for operating concession. The cost of the management contract will require institutional funding through government, est. US$2 million.

Critical Factors for Success

The closure of the TRL railway service is not considered to be a politically acceptable or realistic option – it could have severe negative economic consequences for the land locked countries. The necessary capital cannot be raised without improved management and a credible business plan. The crucial success factor is therefore the urgent appointment of an experienced management team capable of producing a bankable turn-around business plan.

Expected Benefits / Impacts

An improved TRL rail service, competitive with road services in respect of cost and reliability (as has existed before), combined with increased capacity, will have direct economic benefits for both Tanzania and the land locked countries of Burundi, DRC, Rwanda, Uganda and Uganda, through increased trade competiveness, for both regional and international trade – lower prices and improved reliability will increase volumes. A shift of freight from road to rail will also provide environmental and safety benefits.

Table 10. Costs to Procure and Retain TRL Management Team

Component	Investment Start Year	Duration	Cost (US$ million)	PPP Potential
Management contract for TRL, including short term revival, business plan, procurement of funds for revival, preparation of concession process	2011	2 years	2	Consulting Contract – possibly donor funded

Source: Nathan Associates Inc.

2. TRL REVIVAL – INFRASTRUCTURE (INITIAL 3 YEARS)

Background

The Tanzania Railway Corporation/Tanzania Railways Limited (TRC / TRL) service has declined over the past five to six years and traffic levels have fallen to less than 30 percent of the previous highest levels, mainly due to the following events: (i) lack of investment and poor performance of the railways over the period, (ii) the suspension of the Ugandan rail ferry service; (iii) the 2009 flood damage, causing a six month service suspension, and (iv) the failure of the concession with Rites, operating as TRL. The absence of new investment, the declining income and lack of working capital resulted in deferred maintenance of both track infrastructure and equipment, leading to an increasingly unpredictable and unreliable service, and which has severely restricted operating capacity, and the ability to existing and new customers.

TRL is unable to implement a short-term sustainable revival plan without a substantial capital investment, estimated to be about US$ 110 million over a two year period. The capital injection will be required to be justified by a detailed business plan to be prepared by a new management team to be appointed. The TRL service is particularly critical for Burundi, because it previously carried all Burundi's international trade, which is now routed via a much longer and more expensive road route. The same applies to trade with the eastern DRC through the lake ports of Kigoma and Kalemie. The TRL service also provides the shortest distance to any port from Rwanda, and the decline of the lake and rail service has resulted in Rwandan transit traffic being shifted from the Central to the Northern Corridor, at additional cost. As a result of the failed concession, the original budget allocated for the revival of the system, particularly the repair and upgrading of track, (some sections of track date back to 1912), is no longer available.

In respect of the *locomotive fleet*, when the TRL concession commenced in 2006, the total diesel electric locomotive fleet numbered eighty-two units, of which only sixty-five were considered operational, but most of which suffered from deferred maintenance, which translated into very poor reliability. In addition, TRL has thirty-four smaller diesel hydraulic 'shunting' locomotives, of which twenty-seven were recorded as being active. The core of the mainline locomotive fleet consists of thirty-five Canadian MLW Bombardier locomotives, relatively small locomotives of 1,200 hp, of a similar size to those used by Uganda Railways. MLW in Canada ceased diesel electric locomotive production in 1985 (twenty five years ago), and were taken over by GE, which closed the plant in 1993. The bulk of the TRL locomotive fleet can be considered to be beyond its economic life, although it has been possible to keep most of the locomotives operational through a process of continuous repair. When the Government and Rites of India TRL concession commenced operation in 2006, twenty-five used locomotives were imported from India on a lease basis to supplement and replace the MLW units. However the Indian locomotives were not put into service with TRL because of a dispute with the TRL workforce, which considered them to be no better than the existing TRL locomotives. The situation appears to have been resolved in January 2011, but TRL urgently needs to supplement their fleet of available locomotive through repair, acquisition and/or leasing.

When the TRL concession commenced in 2006, *the total wagon* fleet numbered 1,847 units, of which 1,245 were considered operational, but many of which were 'outdated' in their function – such as cattle wagons and many of the large covered wagons, suitable for breakbulk only. Almost all the wagons are of the bogie type, having two sets of two 15 t axles, capable of carrying up to 43 tons of freight. Many of the wagons also suffer from deferred maintenance, and poor reliability. Typically, it is the bearings, wheels and brakes that require attention. The bulk of the freight wagon fleet should ideally consist mostly of low sided open wagons, which can carry heavy bulk goods and also 'drop in' containers – two TEU, and also specialized container wagons and fuel wagons. The current fleet consists of 232 high and low sided open wagons, 84 specialized container wagons, and 145 fuel tanker wagons. Many of the covered wagons, which number more than 720, could be converted to open wagons or container wagons. It is also a relatively cheap and simple process to convert older plain bearing wagons to more reliable and heavier roller bearing axles – this has been carried out extensively in South Africa, Zimbabwe and Mozambique where some serviceable and operating wagons are more than fifty years old. The configuration of the TRL wagon fleet needs to be updated to reflect the future projected freight profile, as defined by the new 'revival' business plan.

In order to recapture freight volumes from road haulers, TRL needs to further develop an *efficient road/rail transfer terminal at Isaka* to serve the mining Tanzanian mining and agricultural sectors and the Rwandan market. Prior to 2004, the TRL rail service on the Central Corridor carried virtually all the transit traffic between the port of Dar es Salaam and the land locked countries of Rwanda and Burundi, and also a significant portion of the trade with Uganda and the eastern DRC. There were also block or unit train operations between Dar es Salaam and Isaka. Since the decline of the TRL service over the past seven to eight years, reflected as lack of capacity and unreliability, most of the Central Corridor transit traffic has moved to road transportation, and in respect of Uganda and Rwanda, there has been a major diversion to the Northern Corridor serving the port of Mombasa. In the case of Rwanda, this has resulted in a longer and more expensive route for international trade, and for transit trade via Dar es Salaam, a much more expensive road service. The business plan for the planned revival of TRL over the next two years will include a target to recapture the Rwanda transit traffic as a multimodal service – by rail between Dar es Salaam and Isaka, about 900 km, and by road between Isaka and Kigali, about 460 km. The development of the Isaka ICD should be promoted by TRL as a railway services marketing drive, to serve Rwanda and northeastern region of Tanzania, including the rapidly developing mining sector, as well as parts of Eastern DRC close to Rwanda.

Description/ Major Components

Funding and implementation of a (1) short term capital investment program for TRL and (2) provision of working capital, over a two year period, to secure the operational improvement of TRL under a new management team to be appointed. The main components of the investment program will be ongoing track repair and upgrading in specified areas. This will be supported by a complementary program for repair and refurbishment of TRL wagons and locomotives, with possible leasing of additional equipment as defined by the approved business plan, which could include any or all of the following options:

- Repair and upgrading of selected units in the existing MLW fleet. (mainline locomotives in South Africa continue to be upgraded and serviceable beyond the age of fifty years in the case of GM or GE units)

- Purchase of new locomotives, most likely remanufactured units, up to 2,000 hp, at a cost of about US$1.5 million each.

- Leasing of locomotives on long term basis, possibly including an agreement on the twenty-five small Indian locomotives already held, alternatively from other regional railway companies such as NRZ in Zimbabwe, modified to 1,000 mm gauge, likely to cost up to US$ 1,200/day on a full maintenance basis.

The TRL operational wagon fleet should be configured in accordance with the requirements of the revival business plan. Assuming an initial target of 3 freight train per day, a 7 day train turnaround, and train lengths of 30 wagons, a fleet of 700 to 800 wagons of the specified types should be available at all times. There are several options which can be pursued simultaneously and jointly:

- Repair, upgrading and modification of existing wagons, and where appropriate, conversion to roller bearing axles, and fitting of dual vacuum and air brakes.

- Purchase of new wagons, mainly container wagons or open bulk wagons, at a cost of about US$50,000 each. Fuel tanker wagons and other special purpose wagons will be more expensive, and should ideally be linked to specific transport contracts.

- Leasing of wagons on long term basis from other regional railway companies such as NRZ in Zimbabwe, modified to 1,000 mm gauge, likely to cost up to US$30/day on a full maintenance basis. Leasing will often promote a higher degree of equipment utilization.

- Encouraging customers to invest in or to supply their own dedicated wagons, to be operated by TRL, in exchange for a discounted rail tariff

The construction of a new Isaka ICD, capable of handling full TRL unit trains of about thirty wagons in the initial phases, ideally with loading and unloading of containers by RMGs, alternatively forklifts in the first phase, provision of large paved container storage areas, equipped with reach stacker(s), truck parking and access, fueling points (service station), administration block, telecommunications, possible ware housing and accommodation with cargo distribution and consolidation services. Initial requirement about 10 ha, phased development (could be similar to the small Kidatu ICD which links the TRL and TAZARA railways, which was fully equipped, also with ware housing, and a reach stacker). This should be complimented by an equally efficient rail intermodal terminal in the port of Dar es Salaam.

Critical Factors for Success

The conditions precedent for the short term capital funding of TRL are (i) that an experienced interim management team is put in place, with full executive powers, and (ii) that a realistic and bankable business plan is developed, plotting clear route to the sustainability of the TRL services, including the future operating structure of TRL.

In respect of the Isaka ICD, the efficient transfer between road and rail is critical for the multimodal service to be competitive with the alternative all road service. Service contracts should be concluded between TRL, the ICD operator (if not TRL), and the road haulers. A performance commitment from TRL will be essential.

Expected Benefits/ Impacts

The reintroduction of a reliable and cost competitive TRL service will have direct benefits for all the existing and previous customers of TRL, by reducing transport costs and transit times, and by improving service predictability. This will lead to increased regional and international trade. It is also expected that the improved TRL service will initiate a shift of freight from road to rail, resulting in lower road maintenance costs and improved safety.

A fully equipped and efficiently managed ICD at Isaka will assist TRL to recapture the Rwanda transit traffic lost to the road services and the Northern Corridor route. The capture of the traffic is very important for the

sustainability of TRL operations. This will in turn benefit Rwanda, parts of Tanzania and DRC for lower transport cost and reduced road maintenance costs.

Table 11. Costs for TRL Revival – Infrastructure (Initial 3 Years)

Component	Investment Start Year	Duration (specify years or months)	Cost (US$ million)	PPP Potential
TRL Revival – Capital expenditure project for the revival of TRL services	2011	2 years	110	Government and donors
TRL Locomotive repair and acquisition	2011	2-3 years	30	Yes
TRL wagon repair, upgrading and acquisition	2011	2-3 years	20	yes
TRL ISAKA Inland Intermodal Container Depot (Terminal)	2011	2 years	25	Yes
TOTAL			185	

Source: Nathan Associates Inc.

3. TRL REVIVAL – INFRASTRUCTURE (YEARS 3-5)

Background/Rationale

The TRL railway concession, which operated from 2007 to 2010, was not successful, in that did not achieve the objectives set out in the concession agreement. The revival of the TRL services is now in the hands of the Government through RAHCO, with the initial objective of putting in place a new management team, whose first task will be to prepare a detailed business plan for TRL, which will provide the basis for new investment to restore TRL to a viable and sustainable business. This first phase of revival will seek to increase freight traffic volumes from the current 0.5 mtpa level to the previous levels of about 1.5 mtpa, achieved more than seven years ago – it will mainly be focused on track infrastructure repair and maintenance in order to improve reliability and reduce train transit and turnaround times. Locomotive and wagon reliability and availability will also have to be improved, but the financing requirements can be linked to customer contracts, as has been done on the TAZARA system.

Once the initial two year revival program has been completed, a new commercial operator for TRL will be sought, most likely a new concession, whose objective will be to further increase traffic volumes, particularly transit freight and to serve the developing gold and nickel mining sector. Nickel exports could generate very large rail volumes of imports and exports. The current track TRL infrastructure consists of long sections of light 30 lb/yard track, mostly in poor condition. The RAHCO action plan presented to the 4th JISR in September 2010, earmarked 330 km of track due for urgent upgrading, including strengthening of bridges to carry heavier axle loads.

The main objective of the medium term TRL infrastructure upgrade is to replace all the 30 lb/yard track with new rails of not less than 40 lb/yard, in order to increase permissible axle loads and the operation of longer trains at higher speeds. Increased volumes will also bring the need for improved signaling systems. The proposals for the construction of a new railway line from Isaka to Rwanda and Burundi are seen as a longer

term development, most likely linked to demand from the mining sector for bulk exports – similarly the proposals for a new standard gauge railway from Dar es Salaam to Isaka. Upgrading of the existing TRL track could in some sections be carried out with provision for future conversion to standard gauge.

TRL is currently in an interim phase, being managed through RAHCO, but with no access to new investment funds. It appears that the Government has adopted the approach of appointing a new management team to prepare a new business plan, which will form the basis of the two year revival budget. After operations have been 'stabilized' and performance has been improved, consideration will be given to structuring new concession.

Description/ Major Components

Phased upgrading of the TRL track infrastructure and signaling systems to allow more 'modern' and competitive train service to be operated – axle loads for 18 t to 20 t, longer trains, faster transit and turnaround times, and greater reliability. In the first instance, this will entail the track infrastructure to be upgraded with heavier rails and structures to a uniform standard on all the main lines, commencing with the lines between Dar es Salaam, Mwanza and Kigoma. It is expected that the rail service to Tanga and Arusha will be reopened and upgraded to the same standard

Critical Factors for Success

The most critical issue is to develop a new business plan for TRL, to serve as a basis for the initial financing, but which will be dependent on the appointment of a resourceful, experienced and professional management team.

Expected Benefits/ Impacts

The immediate benefit will be the resumption of a reliable and cost competitive rail service, directly benefitting trade with Burundi, the DRC, Rwanda, and to a lesser extent Uganda. The infrastructure upgrade will further increase reliability and serve as an additional incentive for the development of the nickel mining sector in Burundi and north eastern Tanzania. Track upgrading will also allow the transport of heavy abnormal loads for the mining industry – the cost of road transport of heavy equipment within Tanzania is presently prohibitive.

Table 12. Costs for TRL Revival – Infrastructure Years 3-5

Component	Investment Start Year	Duration (specify years or months)	Cost (US$ million)	PPP Potential
TRL Infrastructure Upgrade, longer term, 1600km of mainline Dar Mwanza, Taboro - Kigoma	2013	3 years	350	Yes
TOTAL			350	Yes

4. Revival of RVR System (Kenya and Uganda)

The Kenya railway system followed the same pattern of decline as the other regional railways, with traffic levels falling to a third of the previous peak levels. Prior to road transport deregulation in 1992, Kenya railways carried 3.74 mtpa (1992/3), and thereafter declined to a level of about 2 mtpa, which was considered too low for independent sustainability for both Kenyan and Ugandan railways. The Kenyan and Ugandan railways were concessioned to a private sector consortium in 2007 headed by the South African Sheltam Group, operating as Rift Valley Railways (RVR). In a similar scenario to the TRL concession, RVR was unable to achieve its initial objectives of increasing reliability and traffic levels. Rather than cancel the concession, a negotiation process led to the sale of the Sheltam shares in RVR to a new investor, Citadel, which appears to be more resourceful both in respect of both financial strength and experience. RVR has now commenced a US$ 290 investment programme for the initial revival on both the Ugandan and Kenyan sections, and also intends to revive and expand the rail ferry services on Lake Victoria. The initial objective is to increase the freight volumes to 4.5 mtpa, believed to be the approximate design capacity of the existing rail system. Citadel is of the opinion that once this is achieved, the planned investment in an alternative new standard gauge railway, which could be seen as a future threat to RVR, will be seen as a lower priority by the government and KR in the short to medium term.

Current Status

The performance statistics for KR / RVR are as follows:

The freight volume statistics show the decline after 1992. The deregulation of road freight was implemented in the southern and eastern Africa region, commencing in the mid 1980's in South Africa. Prior to this, the railway operators had first right of refusal for freight traffic – road transporters operated on a permit system. After deregulation, the state owned railway companies generally carried on their business as before, and did not respond to the new challenges from the road transporters, nor did governments respond by restructuring the railway sector, and invest in modernisation. The consequence for virtually all the regional railway companies, was that they lost freight volume and income while having to maintain the same system – this inevitable led to the closure of low volume branch lines, also in east Africa, and the railway operations as a whole becoming unsustainable in respect of minimum maintenance requirements and new investment. Hence the programme of privatization, which was often a precondition of World Bank support. In hindsight, many mistakes were made during the railway concessioning process, and some of these projects have failed or are in distress. In respect of RVR, which appears to have a new lease of life, the key question is whether they can recapture enough traffic from the road sector to attain a commercially sustainable and profitable operation.

Table 13. RVR Traffic and Performance, 1989-2009

Year	Tonnage	Ton – Km	Revenue (US$)	Avg Haul Dist.(km)	Ave Tariff USc/tkm
1989/1990	3,160,000				
1990/1991	3,530,000				
1991/1992	3,740,000				
1992/1993	3,090,000				
Road Deregulation					
1993/1994	2,520,000				
1994/1995	2,230,000				
1995/1996	1,980,000	1,366,200,000	58,782,000	*690*	*4.3*
1996/1997	n/a				
1997/1998	*2,190,000*	*1,511,000,000*	*71,583,000*	*690*	*4.73*
1998/1999					
1999/2000	*2,250,000*				
2000/2001	*2,250,000*				
2001/2002	*2,250,000e*				
2002/2003	2,262,566				
2003/2004	1,996,584				
2004/2005	*2,000,000*				
2005/2006	1,958,138	1,353,183,000	62,203,600	691	4.60
2006/2007	1,746,788	1,235,853,878	54,740,418	706	
2007/2008	1,765,700	1,209,000,000	51,861,752	685	
2008/2009	1,562,194	1,086,884,917	52,707,763	695	
2009/2010	*2,820,782*	*1,955,458,919*	*94,134,110*	*693*	4.80

Note: estimated figures in italics.
Source: RVR, WFP and 'East Africa Transport Sector Scoping Study', June 1999

The above performance statistics show that the current freight volumes are of the order of 1.5 mtpa for the whole system, one third of the initial RVR revival target. The average rail freight haul distance is indicated at about 690 km, whereas the distances from Mombasa to Nairobi and Kampala, the main destinations, are about 500 km and 1,200 km respectively. This translates into a fairly consistent domestic / transit traffic volume split of about 65/35 percent. The performance and income statistics also indicate an average freight rail tariff of less than US$ 0.05 per tkm, which is considered cost competitive with road haulage on a full return basis for road. The main challenge for rail is to improve reliability and transit times – reduction in derailments and equipment failures.

RVR operates on a meter gauge line with coverage of about 2,735 Km in Kenya and approximately 306 Km in Uganda – made up as follows:

- 530 km (MSA – NRB) of 95lb track
- 920 km (NRB – NRO, NRO – ELD, ELD – MLB, MLB – KLA & NRO – MLO) of 80lb track
- 153 km (MLO – KSM) of 60lb track
- 1435 km of 50lb track

The condition of the RVR track was assessed by the Northern Corridor Infrastructure Master Plan in 2009 and is summarized in Table 14.

Table 14. Condition of Northern Corridor Railways Tracks

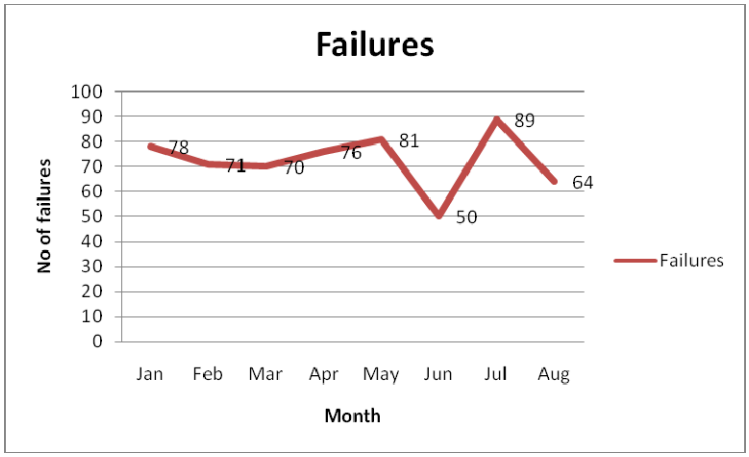
Section	Length (km)	Condition of the track and rail weight	Needed intervention
KENYA			
Mombasa-Nairobi	530	Good/Fair: 95 lb/yard	Spot Rehabilitation Replacement of rails and slippers
Nairobi-Malaba	550	Good/Fair: 80 lb/yard	Replacement of rails and slippers Reconstruction of culverts
Nakuru-Kisumu	217	Fair/poor: 80 lb/yard (60 km) and 60 lb/yard (160 km)	Improvement of track of 160 km Reconstruction of culverts and viaducts
UGANDA			
Malaba-Kampala	250	Fair/poor	Rehabilitation of the line including bridges
Port Bell-Kampala	10	Good	
Kampala-Kasese	332	Poor	Rehabilitation

Source: Louis Berger International, NCIMPS, Interim Report.

RVR has already commenced the repair of the mainline track in the Jinja region in Uganda, where there are sections of poor track in difficult topography, and also low lying swampy areas which require improved cross drainage and restoration of the formation and track. The major railway bridge at Jinja also requires urgent repair work.

As can be seen from Figure 2, from January 2009 – August 2009, RVR experienced a total of 579 mainline locomotive failures, equivalent to two to three failures daily. Major train derailments have been reported at about 20 per month.

Figure 2. RVR Locomotive Failures January-August 2009



Source: RVR.

The RVR concession includes the operation of the 2 Ugandan rail ferries, scheduled to be back in service during 2011, and a proposal has been made to extend the RVR services to the TRL line in Tanzania, with access to the port of Dar es Salaam. The Kenyan rail ferry operating from Kisumu is already back in service, providing an alternative rail/lake route to Port Bell and Kampala while the mainline is being repaired. The revised concession agreement with RVR in Uganda now includes the Tororo – Gulu – Pakwach line, which is likely to be reopened. The Kampala to Kasese line is also being considered for reopening, but is not yet part of the RVR concession. The branch line to Magadi is being operated as a private line with access by Magadi Soda Ash to the main line to Mombasa for their exports.

Revitalization Strategy for RVR

The main commercial shareholding in RVR has been taken over by Citadel of Egypt, a resourceful financial services group with major investments in transport infrastructure and operations. RVR has concluded a management and technical services agreement with América Latina Logística (ALL) of Brazil, an experienced railway operator. RVR has expanded the Ugandan concession to include the Tororo – Pakwach section. Rehabilitation of the worst sections of track in Uganda and Kenya has commenced. The RVR lake ferry service between Kisumu and Port Bell has been revived. Priorities for the short term include:

- Target to increase traffic from current 1.5 mtpa to 4.5 mtpa during first phase – implies a shift of traffic from road to rail.

- The two Uganda wagon ferries are due to be returned to service during 2011, and will likely be used on a triangular service Port Bell – Mwanza - Kisumu

- Commence track repair and upgrading in worst sections – Jinja section in Uganda, and sections of the Nairobi – Mombasa main line, in order to improve reliability, track capacity and transit times
- Commence locomotive rehabilitation and resume maintenance procedures in order to reduce locomotive failures
- Increase freight volume - target container sector, operate block trains develop and expand intermodal terminals at Nairobi and Kampala
- Resume lake ferry services from Port Bell and Kisumu (already commenced)

RVR priorities for the medium term include:

- Improve rail access to the existing and future container terminals – operate longer scheduled block trains from the port
- Target Ugandan oil sector as a major anchor customer.
- Motivate increased state investment in upgraded track infrastructure, Kenya and Uganda – gradually upgrade track to more than 20 t axle loads
- Integrate and coordinate future planning with KPA Lamu Corridor program

The development of the Ugandan oil sector could provide the ideal anchor project or catalyst for the revival of the northern corridor rail systems. Discussions held with Tullow Oil in Uganda indicated that the demand for inputs for the oil sector could be of the order of 300,000 tpa (diesel, equipment and consumables) and that the production program could peak at 250,000 bbl per day, of which up to 100,000 to150,000 bbl per day of crude could be exported by rail to marine terminal. This would be equivalent to 13,000 – 20,000 tons per day or 4.7 – 7.1 million tpa. Assuming 40 wagon trains and 60 t per wagon on the exsiting upgraded railway, this would account for six to nine trains per day on rail. Citadel/RVR has indicated that discssion have already commenced with Tullow Oil, and that they are also considering construction of a rail link from Gulu to Nimule on the Uganda/Southern Sudan border.

The following key projects have been proposed and / or are being implemented to effect a revitalisation of the RVR railway services, with the initial objective of recapturing the previous higher volumes of freight carried. Other related projects include improved rail access to the port container terminals and the development of inland intermodal rail freight terminals at Mombasa and Kampala**.**

1. RVR INFRASTRUCTURE UPGRADE - YEARS 1-3

Background/Rationale

The Kenyan and Ugandan railway systems are operated jointly by one concessionaire, Rift Valley railways (RVR), under two separate concession agreements. The RVR concession followed a similar sequential process to several other railway concessions in eastern and southern Africa:

- decline of the railway services,
- loss of traffic volumes and revenue,
- unsustainable loss-making operations, lack of investment,
- absence of infrastructure and equipment maintenance,
- decision to privatize operations
- lengthy and delayed process of concessioning / privatization, leading to further deterioration of assets and market
- flawed bidding process – selection of concessionaire
- operations in atmosphere of conflict, delay of investment schedule
- non performance of the concession

In the case of RVR, the original commercial shareholder and operator was unable to revive the operations of the railway services in the Northern Corridor, which continued to experience unacceptably high levels of equipment failure and major derailments – traffic volumes remained at low levels. During 2010, a new resourceful commercial shareholder gained control of RVR, with an initial commitment to invest US$ 290 million in the first phase of revival, with plan to increase traffic levels three-fold from the current approximately 1.5 mtpa to 4.5 mtpa.

RVR operates on a meter gauge line with coverage of about 2,735 km in Kenya and approximately 306 km in Uganda. The revised concession also includes the 501 km northern line from Tororo to Pakwack, which remains non-operational. The poor condition of the track has lead to imposition of temporary speed restrictions on many sections across the track, resulting in about twenty major derailments per month and unpredictable transit times.

Description/ Major Components

Initial repair and upgrading of specific sections of poor track in both Uganda and Kenya, which are the main causes of frequent derailments and restricted operating conditions. The first phase of civil engineering works, carried out during years 1 to 3, is focused on the following: .

(i) Addressing inherited maintenance deficit.
(ii) Programmed ongoing track maintenance activities.
(iii) Planned rehabilitation works for particular sections which require more attention than simple maintenance program.

The critical issue in the track rehabilitation program is a 30 km section between Mombasa and Nairobi where rails are worn beyond permissible wear, with damaged sleepers and missing / damaged fittings and fasteners including ballast deficiency. The estimated cost of repairs in KES 475 million (US$ 6 million, or US$ 200/km).

Similarly, there is a critical section of poor track drainage in the Jinja region in Uganda, with severe speed restrictions and limited train lengths of ten wagons – work on this section has commenced.

Critical Factors for Success

The key success factor is that the financing is secured and that the initial rehabilitation program is not delayed. The track rehabilitation programme has been commenced within the initial capital budget of US$290 mill., which includes the provision of funds for the rehabilitation of selected locomotives and wagons. RVR will require additional financing for track repairs and upgrades through the governments of Kenya and Uganda, as owners of the infrastructure.

Expected Benefits/ Impacts

The initial RVR repair program is aimed at achieving the removal of speed restrictions hence increased line capacity and the reduction of track related accidents and improved safety and efficiency of operations – improved reliability and transport competitiveness. One of the key objectives is for RVR to be able to operate trains between Mombasa and Kampala as a scheduled seamless service, without the need to change locomotives or to shorten train lengths.

Table 15. Cost of RVR Infrastructure Upgrade Years 1-3

Component	Investment Start Year	Duration (specify years or months)	Cost (US$ million)	PPP Potential
Railway track repair and upgrading in Uganda and Kenya – 1st phase	2010	3 years	250	Yes
TOTAL			250	Yes

2. RVR LOCOMOTIVE REHABILITATION – YEARS 1-3

Background/Rationale

RVR inherited thirty-nine mainline (Class 93/94) diesel electric locomotives from KRC, which form the core of the mainline fleet. These locomotives are North American GE U26Cs, fitted with 2,600 hp engines. A total of twenty-six were built in 1977 and the remainder in 1987 or later. The bulk of the mainline fleet is therefore thirty-seven years old, but continues to remain serviceable and suitable for rehabilitation and upgrading. In southern Africa, many of the mainline locomotives still in service are more than fifty years old, and continue to be serviceable.

RVR operations have been handicapped by the poor condition of locomotives. Out of the thirty-nine mainline locomotives inherited from KRC only twenty-five are currently in service with varying degrees of suspect reliability due to a back log or deferred maintenance. This has lead to a high rate of locomotive/trains failures in transit. Between January 2009 and August 2009, RVR experienced a total of 579 mainline locomotive failures – more than two per day, mostly due to engine failures.

Daily train targets have been six per day on the Mombasa – Nairobi section, now being revised with a target of nine trains per day, with four trains planned to transport containers. In order to meet this target RVR locomotives have been supplemented by locomotives hired from Magadi Soda Company, which operates their own train of the RVR lines between Magadi and Mombasa.

On the RVR Uganda section between Malaba and Kampala, the mainline locomotives are much smaller, similar to those used on the TRL system in Tanzania, 1,200 hp. During the 1980's the Nalukolongo railway workshop near Kampala were equipped and ungraded through a €40 million program by KfW, and it is well qualified to carry out full refurbishment of the Uganda locomotives, subject to financing being available. The longer term objective is to replace the Uganda locomotives with larger units similar to those operated in Kenya, to allow for seamless railway operations.

Description/ Major Components

Repair and upgrading of the existing RVR locomotive fleet in both Kenya and Uganda, in order to achieve availability of more than 90 percent. A major mainline locomotive overhaul is likely to cost more the US$0.5 million per unit. A similar program is being implemented for the wagon fleet.

Critical Factors for Success

Given that the technical skills and workshop facilities are available, the main success criteria are the securing of the necessary finance, and a commitment to the agreed revival program.

Expected Benefits/ Impacts

A more reliable and more competitive railway service, with improved asset availability and utilization, and lower operating costs – leading to increased freight volumes by rail.

Table 16. Cost of RVR Locomotive Rehabilitation - Years 1-3

Component	Investment Start Year	Duration	Cost (US$ million)	PPP Potential
RVR Locomotive Rehabilitation	2010	5 years	20	Yes

Source: Nathan Associates Inc.

3. RVR INFRASTRUCTURE UPGRADE - YEARS 3-5

Background/Rationale

Following the initial 3 year progam for track rehabilitation and upgrades in Kenya and Uganda, focused on improving reliability, lowering operational costs and increasing traffic level and income, the next phase of infrastructure upgrades will be necessary in order to increase capacity.

Freight traffic volumes are projected to increase from the current 1.5 mtpa to 4.5mtpa in the short to medium term, which will be possible by the repair, upgrading and maintenance of the existing infrastructure and equipment. Kenya and Uganda railways have previously carried freight volumes of this order, and the 1 to 3 years and the 3 to 5year revival programs, linked with the development of inland container deports and terminals, should firstly restore reliability of services and market confidence, and secondly increase the carrying capacity of the rail system. The development of new major resource based projects within the northern corridor, such as the Ugandan oil sector, expected to commence production in 2011/12, will generate significant additional demand for railway services for both inputs and outputs. It is possible that the export of crude oil through a new marine terminal at Mombasa or at Lamu, will carried by rail rather than pipeline, with a demand of up to 150,000 bbl/day or 7 million tpa. This will require a further increase of capacity through the provision for longer trains and passing loops, and realignment of some sections. This could also initiate to gradual upgrading of the mainlines to a heavier rail section, and strengthening of selected structures, to allow for increased axle loads. If and when the Mount Kodo iron ore deposit in eastern DRC is developed, which could only be viable if very large volumes are transported, up to 50 mtpa, in order to achieve low unit costs and tariffs, it is likely that a new dedicated rail system will be developed for this project.

Description/ Major Components

The second phase of track rehabilitation, focused on increasing capacity, will involve a degree of upgrading of the track to improve operating speeds and allow for more frequent and longer trains. Improved signaling will also be necessary. The engineering works will include the replacement of worn rails, likely in conjunction with upgrading to allow for heavier axle loads, realignment of sections in difficult topography, and the provision of longer and more frequent passing loops. The program and specifications will largely be determined by demand, particularly if large anchor customers such as the Ugandan oil sector freight volumes come to fruition.

Critical Factors for Success

The success of the first 1 to 3 year phase of track rehabilitation, and the demonstrated ability of RVR to capture a significant volume of both bulk and intermodal traffic from road. Having improved the reliability of the RVR services, the second phase of rehabilitation will be focused on increasing the capacity of the system. This will require additional investments in track improvements by both the concessionaire and governments.

Expected Benefits/ Impacts

The overall benefit of upgrading and increasing the capacity of RVR will be the lowering of operational costs through improved asset utilization, improved profitability for RVR and improved competition with road services.

Table 17. Cost of RVR Infrastructure Upgrade Years 3-5

Component	Investment Start Year	Duration (specify years or months)	Cost (US$ million)	PPP Potential
Railway track repair and upgrading in Uganda and Kenya – 1st phase	2014	2 years	150	Yes
TOTAL			150	Yes

4. RVR MOMBASA INTERMODAL YARD AND EQUIPMENT

Background/Rationale

It is well known that the modal interface between port and the land services of road and rail, is where most time is lost, and significant additional logistics costs are incurred. This is mainly due to issues of documentation and customs clearance, but also because of poor interfaces with both road and rail. The rail facilities at many of the regional container terminals are poor, and the operating procedures have been partially inherited from the pre-containerization period - access via inefficiently operated marshalling yards, where trains are stopped, checked and often broken up or retained. Ideally, the intermodal trains should enter the port directly as a unit, with a detailed manifest of all the containers carried. The rail sidings at the Mombasa container terminal are 450 m long, capable of handling trains of up to thirty wagons, with loading and unloading by RMGs (rail mounted gantries). As the mainline track is upgraded, and the use of vacuum brakes is standardized, with increased traffic volumes, trains of up to fifty wagons should be allowed for. Conversion to standard gauge will allow much longer trains, but not yet justified by the traffic volumes.

The Mombasa container terminal is far too narrow – about 200 m instead of the recommended 500 m – resulting in terminal congestion and interference between the road and rail services. If the proposed system of integrated near port ICDs is adopted, then both road and rail mode will became more efficient. With the planned expansion of the existing container terminal with Berth 19, it appears that the existing rail sidings can be lengthened to accommodate longer trains. It is important in any new development or conversion of conventional Berths, that utmost attention is given to the positioning and length of sidings, and the equipment specified. Clearly the layout, positioning and equipment selection for the intermodal rail sidings at the planned new terminal at Kipevu West must be determined in close liaison with RVR and KR.

Description/ Major Components

The lengthening of the rail sidings at the existing container terminals in conjunction with the extension of Berth 19, the provision of additional RMGs, and additional terminal equipment – reach stackers, rubber tired gantries

and port tractor - trailer units. If the intermodal rail service is operated as a block or unit train, with fast loading and unloading times, there should be b]very little requirement for wagon shunting.

Critical Factors for Success

The key success factor will be the commitment of RVR to operate a unit or block intermodal rail service, and the ability of RVR to enter into a performance based contract with KPA, or the relevant future operator

Expected Benefits/ Impacts

The expansion, upgrading and successful operation of the Mombasa RVR intermodal rail terminal will improve service and, thus, promote rail services, and should assist in shifting both transit traffic and regional trade from road to rail. This will result in reduction of transport cost due to increased competition

Table 18. Cost of Mombasa Intermodal Yard and Equipment

Component	Investment Start Year	Duration	Cost (US$ million)	PPP Potential
RVR Upgrading of Mombasa Intermodal yard	2010	3 years	20	Yes

Source: Nathan Associates Inc.

5. RVR KAMPALA ICD DEVELOPMENT

Background/Rationale

The Ugandan and Kenyan railway systems are operated as an integrated railway service by RVR on a twenty-five year concession basis. The operation of the two systems is controlled by separate agreements, and is effectively operated as two systems with locomotive and crew changes at the Kenya / Uganda border. The operation of a truly seamless rail service between Mombasa and Kampala is presently prevented by the poor condition of sections of the Ugandan track infrastructure, which demands that lighter locomotives are used with shorter train lengths. In order for RVR to achieve its short term freight traffic projections of 4.5 mtpa, it will have to capture traffic from road, with a service which is more competitive with road. Ideally, unit trains should be operated between the terminal points, without the need to break up the train into shorter units – this will allow fast transit and turnaround times and reduced operating costs.

However, in most cases rail has the disadvantage of lack of flexibility, and requiring the delivery or pickup to and from the end customer to be carried out by road. The efficiency of the modal transfer points, normally located at the inland rail container depot or terminal (ICD), is critical to the competitiveness of rail. Prior to containerization in the 1970's, and the deregulation of road transport, it was common practice for the railway operators to deliver wagons to the customers sidings for loading and unloading. This is no longer considered operationally viable, because of the resulting low equipment utilization, unless it is a large customer with fixed consignments or dedicated wagons, and who is willing to pay extra for the wagon re-positioning service (for example Mukwano in Kampala for their edible oil imports).

The alternative is for the railway operator to have a highly efficient and well equipped container terminal, including customs services, where containers can be transferred between road and rail quickly and at a low

cost. It is important for the railway operator to turn the unit train around as quickly as possible. The expansion and upgrading of the Kampala rail ICD is therefore an important part of RVR's marketing strategy. Previously, about eight years ago, it was also proposed to develop an ICD at Port Bell, and the viability of this will depend on how the Lake Victoria container services are operated in future.

Description/ Major Components

The existing yard is to be expanded and upgraded, with new equipment and longer rail sidings. Rail access should be directly from the main line and road access should be directly to the key ring roads and bypasses. Ideally train loading and unloading should be by RMG's, and yard equipment should be reach stackers and/or rubber tired gantries. There should be sufficient space for future major expansion – this is often a short coming of ICDs.

Critical Factors for Success

The key success factor is the commitment by RVR to operate a reliable and scheduled unit train service to and from Kampala – the RVR ICD will attract other private sector logistics operators to move closer to the ICD, to offer distribution, consolidation and warehousing activities. This has happened at other inland successful rail freight terminals.

Expected Benefits/ Impacts

The expansion, upgrading and successful operation of the Kampala ICD (rail freight terminal) will directly promote rail services, and should assist in shifting both transit traffic and regional trade from road to rail. It implies that services will be improved and costs be lowered form the increased competition. This, and similar developments elsewhere, is an essential element of the RVR marketing strategy.

Table 19. Cost of Kampala ICD Development

Component	Investment Start Year	Duration	Cost (US$ million)	PPP Potential
Kampala ICD Development	2010	3 years	10	Yes

Source: Nathan Associates Inc.

6. RECONSTRUCTION OF THE TORORO – GULU – PAKWACH RAILWAY

Background/Rationale

The northern railway from Tororo in Uganda, through Gulu to Pakwach, was completed in 1964, a total distance of about 500 km. Due to several periods of conflict in northern Uganda, and the and the decline of traffic levels, the line was closed, and all freight traffic diverted to road. The security situation in northern Uganda has improved, and this route now provides the main conduit for international trade with southern Sudan (more than 200, 000 tpa through Mombasa in Kenya). In addition, the development of the Uganda oil sector in the region served by the northern railway will require significant imports of equipment and materials, and the possibility of crude oil exports of up to an estimated 7 mtpa by rail.

The feasibility study for reopening the railway to Gulu and Pakwach has been completed (not yet seen by the consultants) and the RVR railway concession agreement has been expanded to include the northern line. Proposals have also been considered by the Ugandan and south Sudanese governments for upgrading the line from Tororo to Gulu to standard gauge (400 km) and extending the railway from Gulu to Juba in southern Sudan (250 km), to serve as an alternative route to the proposed Juba to Lamu standard gauge railway. This is likely to be a long term project, but the reopening of the existing line is considered to be a short term priority.

Description/ Major Components

Upgrading of the existing northern railway, approximately 500 km, from the current 25 kg/m rail to +40 kg/m track, 20 ton axle loads, with possible realignment in sections in order to increase operating speeds. This will include strengthening of bridges and culverts, lengthening of passing loops, and provision for later upgrading to a standard gauge specification (three rail system). RVR is the designated operator. Estimated cost in the region of US$ 325, depending on the recommendation of the feasibility study. This could be implemented as a phased PPP project.

Critical Factors for Success

The success of the project will in the first instance depend on the financial and political support from the Ugandan government, and also the ability of the rail concessionaire to enter into a long term contract with the key investors in the Uganda oil sector – for both inputs and outputs

Expected Benefits/ Impacts

Given the location of the initial productive oil wells in the northern region of Lake Albert, the reconstruction and upgrading of the northern railway is considered essential, and could well provide the much needed anchor project for the revival of the regional rail transport sector as a whole. It will also provide improved and lower cost access north west Uganda, with likely political and security benefits, and will provide an improved trade route with southern Sudan through Nimule.

Table 20. Cost of Reconstruction of the Tororo – Gulu – Pakwach Railway

Component	Investment Start Year	Duration	Cost (US$ million)	PPP Potential
Reopening and upgrading of the Tororo – Gulu Pakwach railway	2011	2 years	325	Yes

Source: Nathan Associates Inc.