REPUBLIC OF NAMIBIA

MINISTRY OF WORKS AND TRANSPORT

Feasibility Study for the Trans-Zambezi Railway Extension Grootfontein-Rundu-Katima Mulilo

Final Feasibility Study Report (Vol II. Project Feasibility)

March 17th, 2022

Prepared and Submitted by

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Details of Report

Project Name	**:**	**Feasibility Study for the Trans-Zambezi Railway Extension Grootfontein-Rundu-Katima Mulilo**
Contract/ Work Order No.	:	MWT/TIIP/ISCB/20/05
Document Name	:	Final Feasibility Report (Vol II. Project Feasibility) - Feasibility Study for the Trans-Zambezi Railway Extension Grootfontein-Rundu-Katima Mulilo
Document No.	:	MRTCL/Project/MoWT (GRN)/Final Feasibility Study Report/003B
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Submission of Report

Revision#	Date	Prepared by	Reviewed by	Approved for Issue by
00	17th March, 2022	Project Team	Adriaan van der Merwe (Team Leader)	Sanjay Mittal (Project Director)

Letter for Submission of Report

Ref No.: MRTCL/Project/MoWT(GRN)/Final Feasibility Report/003B March 17th, 2022

To,
Executive Director
Ministry of Works and Transport
6719 Corner of Bell Street & Snyman Circle
Private Bag 13341,
Windhoek, Namibia

Project: Feasibility Study for the Trans-Zambezi Railway Extension Grootfontein-Rundu-Katima Mulilo

Reference: **Contract No. MWT/TIIP/ISCB/20/05 dated March 10th, 2021,** Between Ministry of Works and Transport (MoWT) and M. R. Technofin Consultants Ltd.

Subject: **Submission of 'Final Feasibility Study Report – Vol II. Project Feasibility'** for Feasibility Study for the Trans-Zambezi Railway Extension Grootfontein-Rundu-Katima Mulilo

Dear Madam,

We are pleased to submit the 'Final Deliverable' for this project – **'Final Feasibility Report – Feasibility Study for the Trans-Zambezi Railway Extension Grootfontein-Rundu-Katima Mulilo'.**

The report is comprised of following volumes:

Vol I. – Preliminary Design Report

Vol II. – Project Feasibility

Vol III. – Project Drawings

This is Vol II. of the Report.

Following the written comments to the 'Draft Feasibility Study Report – Vol II. Project Feasibility' which were received on March 1st, 2022, we are pleased to submit the '**Final Feasibility Study Report – Vol II. Project Feasibility'** for the subject project.

We have addressed the Ministry's comments comprehensively as reflected in the 'Response Matrix', attached separately. We are available to discuss its contents at any time, if so required.

Yours Sincerely,

M.R. Technofin Consultants Ltd. CANADA

For M R Technofin Consultants Ltd.

Sanjay Mittal

President and Project Director

Acronym/ Abbreviations and Technical Terms

Acronyms	Full Forms
AfDB	African Development Bank
DRC	Democratic Republic of Congo
EMC	Environmental Management Act
EIA	Environmental Impact Assessment
EPC	Engineering, Procurement and Construction
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FEED	Front End Engineering Design
FOB	Free on Board
GHGs	Greenhouse Gases
GRN	Government Of Namibia
Ha	Hectare
IRR	Internal Rate of Return
mm	Millimetre
MME	Ministry of Mines & Energy
MoWT	Ministry of Works and Transport
MRTCL	M R Technofin Consultants Limited
NAD	Namibian Dollar
PPA	Public Procurement Act
PPP	Public-Private Partnership
SACU	South African Customs Union
SADC	South African Development Community
TDR	Travel Demand Report
TIIP	Transport Infrastructure Improvement Project
TZR	Trans-Zambezi Rail
USD	United States Dollar
VAT	Value-Added Tax

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Executive Summary

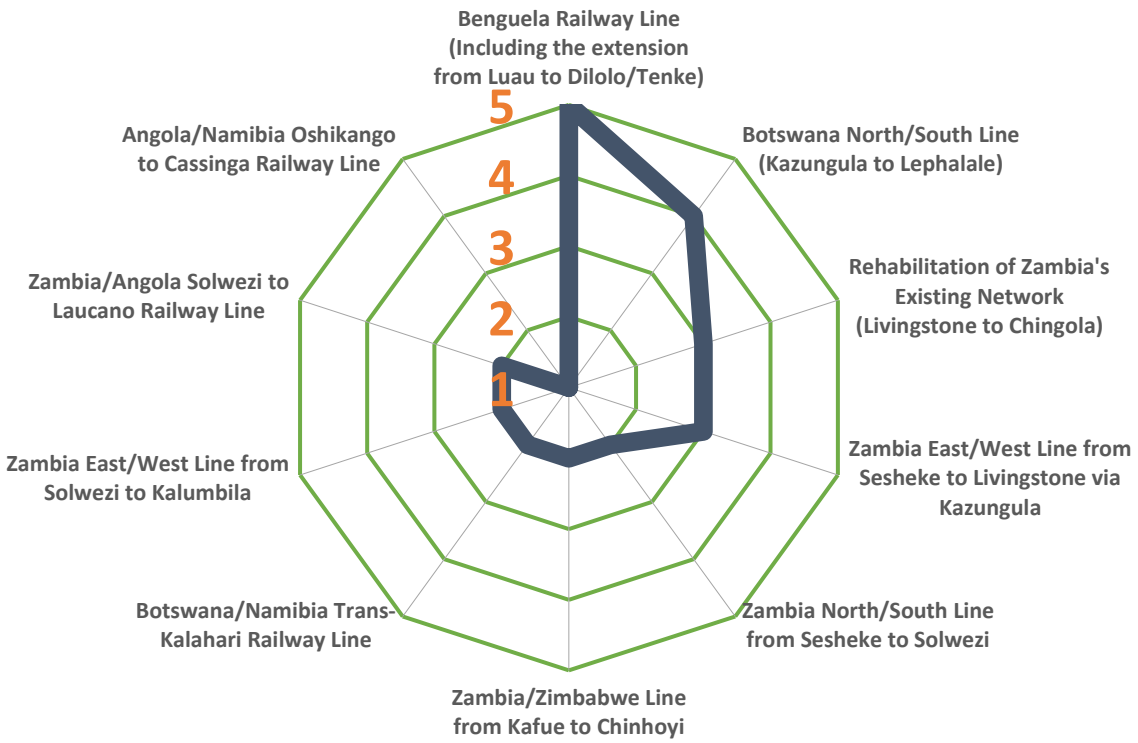
Traffic Scenarios

Freight forecasting for the Trans-Zambezi Rail (TZR) entailed developing a list of railway development and rehabilitation projects in the Southern African Development Community (SADC) region that could materialize and potentially impact (positively or negatively) the TZR's freight potential. These developments were ascertained through consultations, field missions and desk research.

Each potential railway development in the region was qualitatively assessed and given a score on the likelihood that it would be fully developed and become operational. A score of one meant a low probability of the project developing and a maximum score of five meant a high probability.

The qualitative assessment was based on in-depth consultations with transport authorities in neighbouring countries and the scoring is provided. See Figure ES-1 below. Railway developments that had activities such as (pre)feasibility studies completed or were in the process of being contracted for construction were given a score of three or better.

Figure ES-1: Scoring Regional Railway Developments (1 = low probability of developing, 5 = high probability of developing)



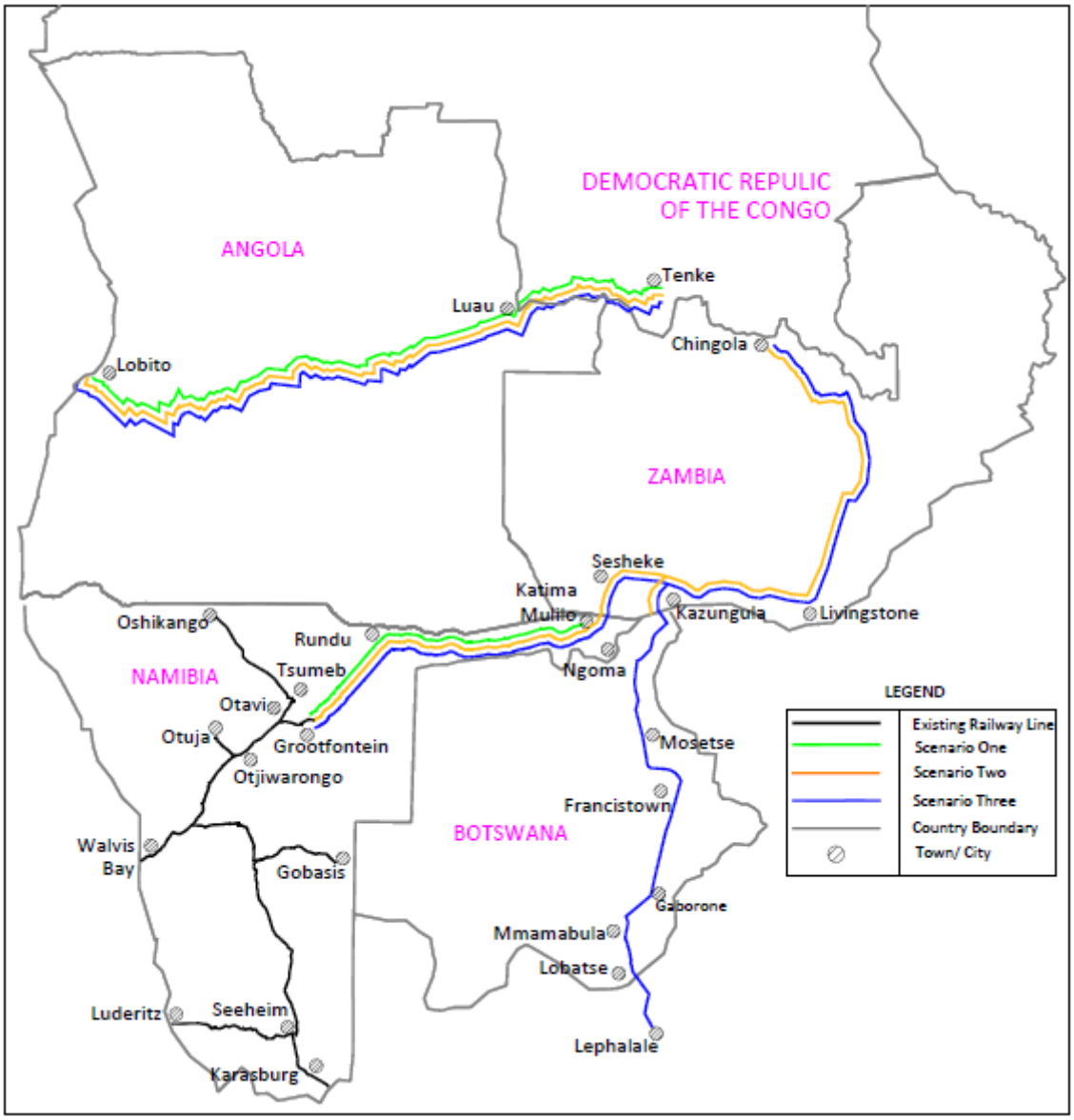
Note: The Trans-Zambezi Rail is not shown in the above figure as it is assumed to be built

Projects that scored three or higher were carried forward for analysis in the financial and economic chapter. The table and figure that follow summarize the scenarios that were carried forward.

Table ES-1: Railway Development Scenarios Carried Forward

Updated Scenario #	Trans-Zambezi Rail is built	Benguela Line (including extension from Luau to Dilolo/Tenke) is successfully tendered	Zambia's existing network from Livingstone to Chingola is rehabilitated	Zambia East/West line from Sesheke to Livingstone via Kazungula is built	Botswana North/South Line (Kazungula to Lephalale) is built
Primary Funding Responsibility	Namibia	Angola	Zambia	Zambia	Botswana
1	Included	Included	Not Included	Not Included	Not Included
2	Included	Included	Included	Included	Not Included
3	Included	Included	Included	Included	Included

Figure ES-2: Railway Development Scenarios Carried Forward



A summary of freight forecasts for the above-mentioned scenarios can be found in Appendix A. Developing the freight forecasts themselves were covered in the second milestone submission of the assignment – the Travel Demand Report.

Financial Assessment

The financial assessment is grounded on a discounted project-level cash flow analysis using the Microsoft Excel backbone. Specifically, elements from other sections of this feasibility report such as traffic estimates, infrastructure expenditures and rolling stock requirements/procurement were used to develop a rail operating model.

Unit cost estimates were then applied to outputs of the operating model (e.g., gross-ton km per annum, rolling stock km per annum, etc.) to arrive at operating, maintenance and management expenditures for rail infrastructure and operations, separately. These costs were forecasted and compared against forecasted revenues and capital expenditures to determine the project valuation.

The basis for estimating the tariff for the proposed TZR is TransNamib's existing tariff card. Specifically, a review of TransNamib's annual revenues and tonnage hauled indicated at tariff of N$0.67 per ton-km in 2019. Converting this into USD using the average 2019 exchange rate and applying an inflation factor, the base tariff assumed for the financial assessment is US$0.048 per ton-km.

Assuming that the railway line is built over four years, Table ES-2 summarizes the construction-period disbursement schedule to develop the railway infrastructure. Note that it is assumed that 2022 will include pre-construction activities (detailed design and funding mobilization) with construction commencing in 2023.

Table ES-2: Construction Disbursement Schedule (US$ Millions, 2021 prices)

Expenditure Item	Expenditure Amount (USD Millions, 2021 prices)	1-Jan-23	1-Jan-24	1-Jan-25	1-Jan-26
		31-Dec-23	31-Dec-24	31-Dec-25	31-Dec-26
Permanent Way and Formation	1,374.78	343.70	343.70	343.70	343.70
Structures	440.52	110.13	110.13	110.13	110.13
Workshop, Tools & Plants and Electrical	63.70	0.00	0.00	31.85	31.85
Signal & Telecommunication	128.13	0.00	0.00	32.03	96.09
Preliminaries, Contingencies and Project Management	223.97[1]	55.99	55.99	55.99	55.99
Land Acquisition & Resettlement	35.24	35.24	0.00	0.00	0.00
Total	2,266.34	545.06	509.82	573.70	637.76

1. Includes provisions for design and construction
Note: Figures may not add up exactly due to rounding

Capital renewals in the model are triggered when a capital item reaches the end of its useful life. The renewal expenditure is based on the related expenditure estimate made upfront and indexed to inflation.

Capital upgrades will be required to meet increases in traffic. For modeling purposes, upgrade expenditures are accounted for in the yearly infrastructure maintenance costs (see bolded cost items in Table ES-3 below).

Table ES-3: Infrastructure Management and Fixed Asset Maintenance Cost Assumptions

Cost Item	Assumption	Comment
Insurance	1.00%	% Of Gross Fixed Asset Cost per Annum
Infrastructure Administration (Management, Commercial)	1.420	US$ Millions (2021 prices)
Permanent Way and Formation Maintenance Cost	0.004	USD per Gross Tonne-KM per Annum
Structures Maintenance	2.0%	% Of Component's Gross Fixed Asset Cost per Annum
Workshop, Tools & Plants and Electrical Maintenance	5.0%	% Of Component's Gross Fixed Asset Cost per Annum
Signal & Telecommunication Maintenance	5.0%	% Of Component's Gross Fixed Asset Cost per Annum

Railway operations and maintenance cost assumptions (per annum) are summarized in Table ES-4.

Table ES-4: Railway Operations and Rolling Stock Maintenance Cost Assumptions

Cost Item	Assumption	Comment
Crew Costs		
Locomotive Crew Cost	0.075	US$ Millions per Crew (2021 prices)
General Expenses		
Insurance	1.00%	% Of Gross Operating Asset Cost
Operational Administration	1.265	US$ Millions (2021 prices)
Operating Expenses		
Fuel Price (Before Fuel Levy Refund)*	0.982	USD/Liter (2021 prices)
Fuel Price Refund Percentage*	9.02%	% Of Fuel Price
Fuel Price (After Fuel Levy Refund)*	0.893	US$/Liter (2021 prices)
Locomotive Maintenance Cost	1.700	US$/Locomotive-KM (2021 prices)
Freight Wagon Maintenance Cost	0.080	US$/Wagon-KM (2021 prices)

*Note: The Road Fund Administration refunds the fuel levy (currently N$1.48 per litre of diesel or fuel) to 'off-road' users such as rail, maritime, construction and agriculture sectors. It is the Consultant's understanding that TransNamib is refunded 95% of the fuel levy.

The project internal rate of return (IRR) by scenario is summarized in Table ES-5 and is calculated based on the entire forecast period from 1-Jan-22 to 31-Dec-69.

Table ES-5: Project Returns by Scenario

Scenario	Project IRR
One	5.9%
Two	9.7%
Three	9.1%

The positive IRR for each scenario indicates that over the forecast period, net project cash flows do cover capital costs and rolling stock procurement. However, certain risks certainly

make it difficult to raise equity and financing through traditional means such as the capital markets. These risks are:

1. PPP development in Namibia's transport sector (and the country in general) is still in its nascency. A lacking positive track record would make it difficult to raise capital at reasonable rates.

2. The TZR is a Greenfield project with significant traffic risk (discussed further in the next section). Current road traffic on the route is not sufficient to support the project and the TZR would rely on attracting regional traffic traversing other routes.

3. A major challenge in financing railway projects has to do with the attractiveness of fixed railway assets as a means of recourse to lenders. Fixed railway assets are 'bespoke' in nature and therefore have a limited resale value.

To compensate for these significant risks, it can be safely assumed that the private sector will want a significant premium on the cost of capital which would have to be further backed by guarantees. A realistic project-return benchmark between 15% and 17%

Project Structuring with Private Sector Participation

Various PPP project structuring options were tested in the financial model. This ranged from the public sector bearing all upfront and yearly expenditures and engaging an operator on a management contract basis to a combination of public and private sector cost and service responsibilities.

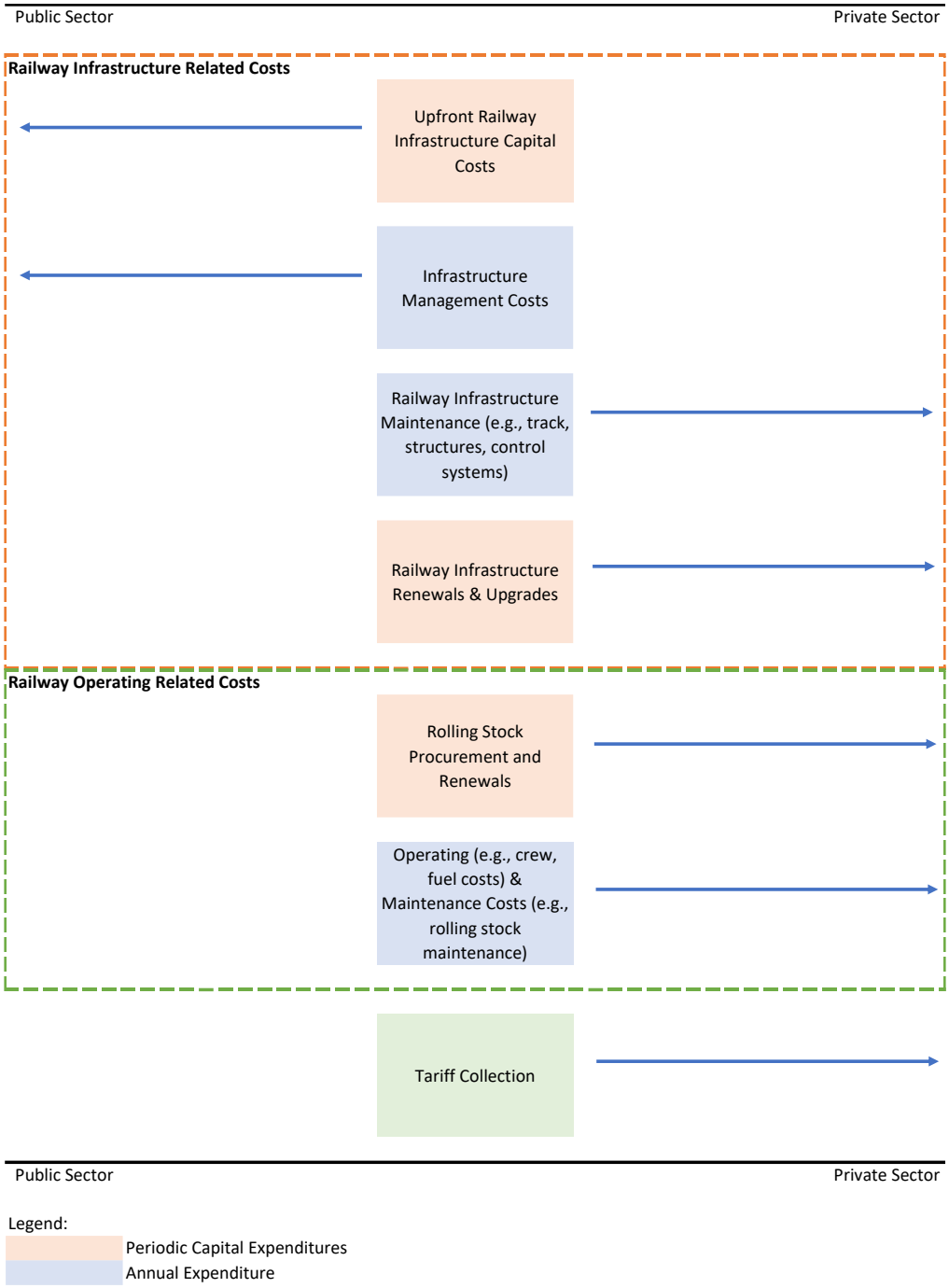
The most ideal scenario to be found is summarized in Figure ES-3 whereby the state develops the proposed TZR and makes it available to a private operator (or private operators). The financial outlays that the state would be responsible are:

- Capital costs to develop the TZR's fixed infrastructure
- Yearly fixed infrastructure insurance costs
- Yearly infrastructure management costs (operations and commercial management of the private operator)

The private operator would be responsible for collecting tariff revenues which would cover its following responsibilities (costs):

- Rolling stock procurement and renewals including rolling stock purchases following operational commencement to meet forecasted increases in traffic
- Annual railway operating and maintenance costs such as crew and fuel costs as well as rolling stock maintenance costs
- Annual railway infrastructure maintenance costs including the cost to maintain track, structures, and control systems
- Major railway infrastructure maintenance and upgrades, as required, to meet increases in traffic

Figure ES-3: Project Structuring and Public and Private Sector Responsibilities



Concession Fee / Access Charge

The structure proposed in ES-6 effectively keeps MoWT as the 'infrastructure owner' with the Ministry 'collecting rent' from a rail operator. This framework is also proposed in the 2018 Namibian Transport Policy.

'Rent' would be in the form of a yearly concession fee or access charge. As the state would be developing and providing the TZR infrastructure (US$2265 billion in 2021 prices), a yearly concession fee/access charge for the right to operate on the line would be collected from the operator.

Assuming that a private operator will target a 17% project IRR under the proposed structure in Figure ES-3, Table ES-6 summarizes the annual concession fee/access charge the state can expect by scenario for a 25-year concession period.

Table ES-6: Yearly Concession Fee/Access Charge as a Percentage of Revenue

Scenario	Concession Fee/Access Charge as % of Yearly Revenue
One	26.0%
Two	35.5%
Three	36.2%

The State's Financial Position

Under the structure proposed above, the state will develop the proposed TZR and make it available to a private operator (or operators). In return, the state will collect a concession fee/royalty to cover the cost of developing the line as well as its own infrastructure management costs.

To illustrate the state's financial position over the forecast period, it is assumed that Namibia will enter into a sovereign loan agreement to develop the railway line. The terms of the loan agreement are summarized in Table ES-7 and are based on project appraisal reporting from AfDB's loan for the New Port of Walvis Bay Container Terminal Project.

The fixed lending rate (prior to the lending spread) was taken from AfDB's most recent publication of applicable lending rates for sovereign guaranteed loans from August 1, 2021, to January 31, 2022.

Table ES-7: Sovereign Loan Assumptions

Loan Parameter	Assumption	Comment
Tenor	20.00	Years
Payment Moratorium on interest and principal	5.00	Years
Interest Capitalized during Moratorium?	Yes	
Payback Period	15.00	Years
Lending Rate	1.02%	%
Lending Spread (Project Specific)	0.60%	%
All-in Rate	0.75%	%
Front-end Fee	0.25%	%
Commitment Fee	0.25%	%
Loan Amount	2,895	USD Millions
Loan Amount after Capitalized Interest	2,954	USD Millions
Loan Repayment Start Year	**2028**	
Final Loan Repayment Year	**2042**	

Table ES-8 provides timing highlights of when the state's cash flows specific to this project become positive and the year in which positive cash flows cover the years of deficit spending (the construction period and either all or partial years of loan servicing based on the scenario).

Table ES-8: State Cash Flow Highlights by Scenario

Scenario	Year in which state cash flows become positive	Year in which cash flows fully cover years of deficit project spending
One	2043	2058
Two	2035	2043
Three	2037	2044

Expectantly, the state's cash performance on the proposed TZR project performs the best when the line is further connected to Zambia (scenario two and three). Under scenario two and three, the cash performance would likely further improve if there were an agreement with Zambia to share the cost of rolling stock.

Project Structure Tweaks

Financial modeling shows that under an open access PPP structure, the returns are sufficient for a private operator to be made responsible for major maintenance renewals and upgrades. Practically however, operators may shy away from this responsibility or may delay major renewals and upgrades due to profit incentives.

Under a structure whereby MoWT remains responsible for major maintenance and upgrades, a 'Transport Investment Fund' can be developed and legislated to fund such works. Note that under such a structure, concession fees/access charges to the state would be higher (relative to what was derived in Table ES-6) as the private operator would not be responsible for major maintenance and upgrade expenditures. As such, a portion of the concession fee/access charge could be used to capitalize the 'Transport Investment Fund' with the fund being used to maintain/upgrade the line.

Economic Assessment

The economic assessment was conducted by converting financial benefits and costs into economic benefits and costs directly in the financial model that was developed for the previous section. In addition, revenues were modified so as to no longer reflect the tariff revenues collected from rail operations, but rather the transport cost savings and other benefits achieved by switching of the forecast traffic flows from the parallel road route through Namibia, or from other routes through neighbouring countries, to the TZR.

It is important to note that the quantified costs and benefits refer strictly to those incurred or enjoyed along the new 772-km line between Grootfontein and Katima Mulilo. Under the different scenarios reviewed, various assumptions have been made about parallel investments in neighbouring countries though no attempt has been made to evaluate additional costs and benefits which will be associated with parallel investments in Zambia or Botswana.

Quantified economic benefits consist mainly of (i) road transport cost savings and (ii) reduced road maintenance costs which are divided into the two following streams:

1. Current road traffic travelling along the Trans-Zambezi Corridor that would shift to the TZR (namely, Namibia's existing import, export and transit traffic along the corridor). Using conventional terminology for highway studies, this traffic is considered as '**Normal**' traffic enjoying a reduction in transport cost as it makes a modal transfer from road to rail.

This Normal Traffic is calculated by subtracting TZR road traffic flows under railway Scenarios One, Two and Three from the road flows under the Base Scenario without the railway'.

2. Other regional traffic that currently travels on routes outside of the Trans-Zambezi Corridor but would shift to the TZR. The terminology for this traffic is referred to as '**Diverted**' traffic.

For the purposes of this study, diverted Traffic (from other routes) will account for all further traffic on the railway other than the Normal Traffic already defined above. This may be computed by subtracting these Normal Traffic flows from the total rail flows forecast under Scenarios One, Two and Three.

Road transport cost savings and reduced road maintenance costs (economic benefit) were calculated by subtracting the estimated road traffic in Scenario One, Two and Three from the base case scenario where the TZR is not built and all existing import, export and transit traffic remain on the road along the Trans-Zambezi Corridor.

Diverted traffic also enjoys a transport cost reduction benefit since it has transferred from another route, but, since it previously chose to move by this other route rather than by the road on the Trans-Zambezi corridor, it can be assumed to earn a unit benefit per tonne lower than that computed for normal traffic making a simple modal transfer.

In other words, the unit benefit achieved by the regional transfer traffic must lie between zero and the unit benefit achieved by modal transfer traffic. The normal practice adopted for diverted traffic in such studies is to attribute an average unit benefit per ton of 50% of that for normal traffic.

Economic costs were estimated by converting financial prices into economic prices of goods and services to express true resource values. The principal adjustment made was to remove indirect taxes, duties, and subsidies, which distort these resource values.

Table ES-9 summarizes the economic internal rate of return by scenario based on the preceding discussion on economic benefits and costs particular to the TZR.

Table ES-9: Economic Internal Rate of Return by Scenario

Scenario	Economic Internal Rate of Return
One	4.7%
Two	14.6%
Three	13.7%

As can be expected, the scenarios where the TZR forms part of a wider regional railway system (i.e., connected to Zambia and/or Botswana), produce the highest economic returns. This further confirms that the TZR stands to benefit the most when it is further connected to Zambia's existing network (Scenario Two) and to a slightly lesser degree, with Botswana also connecting its current railway system with Zambia (Scenario Three). The TZR without railway development cooperation from Zambia and Botswana leaves many benefits 'on the table'.

It is also important to note that there are further economic benefits that were not quantified but would further add to the economic returns. Such benefits include:

- Reduced empty backhaul of trucks
- Potential net savings in accidents (rail vs. trucks)

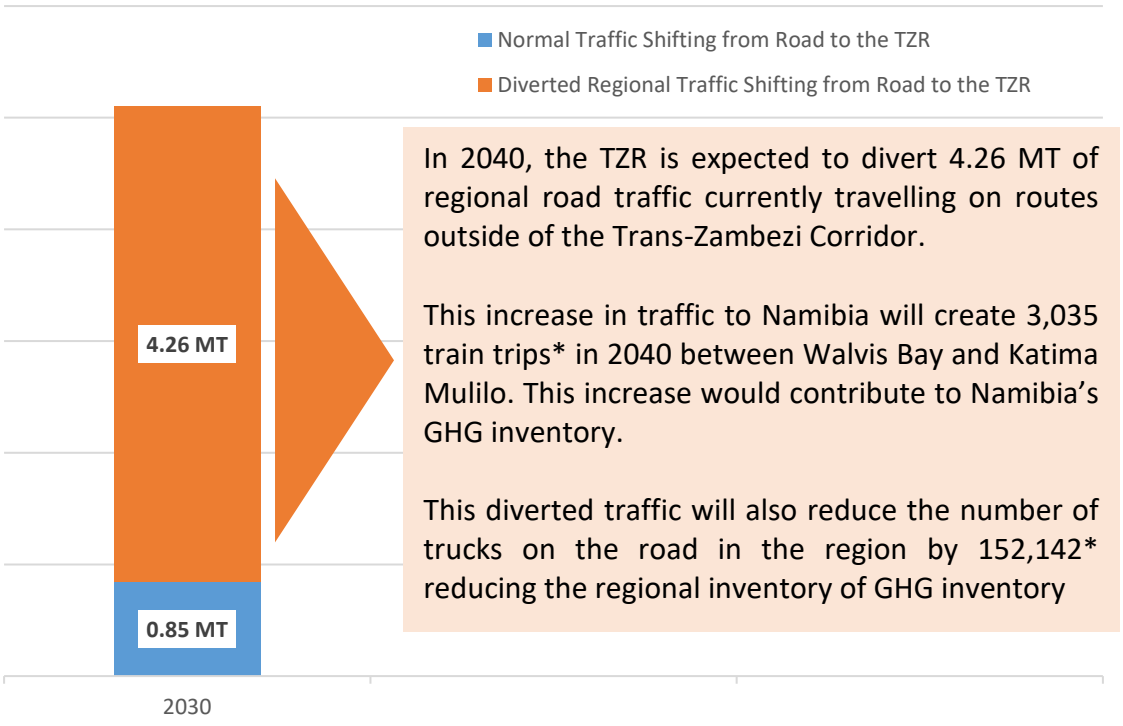
The community will also benefit from higher direct employment both during the construction phase and operational phase. However, with traffic shifting from road to rail, truck employment is expected to be negatively impacted. However, it can be expected that society **as a whole**, will from having the Trans-Zambezi Rail developed.

Greenhouse Gas Emissions

The TZR is expected to divert regional traffic that currently travels on routes outside of the Trans-Zambezi Corridor. Greenhouse gases (GHGs) are not localised gases and so, the impacts are felt regionally and beyond. Figure ES-4 illustrates this in the context of the TZR.

While the regional traffic that is diverted to the Trans-Zambezi Corridor will increase Namibia's GHG inventory. The reduced truck traffic will decrease the region's GHG inventory.

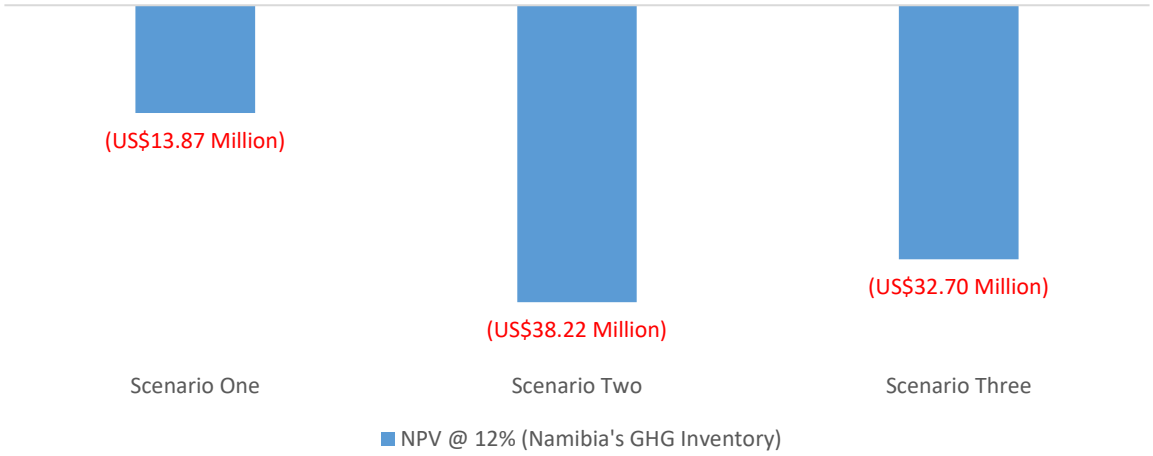
Figure ES-4: TZR's Net Impact on GHGs (Scenario One, 2040 as an Example)



*Assumes that the average payload of one train consist and truck is 1,404 tonnes and 28 tonnes, respectively

Discounted at a social rate of 12%, Figure ES-5 summarizes the net present value of Namibia's GHG inventory in US dollar terms. As expected, the trains required to haul regional traffic diverted to the TZR represents an incremental social cost to Namibians.

Figure ES-5: Namibia's GHG Inventory by Scenario

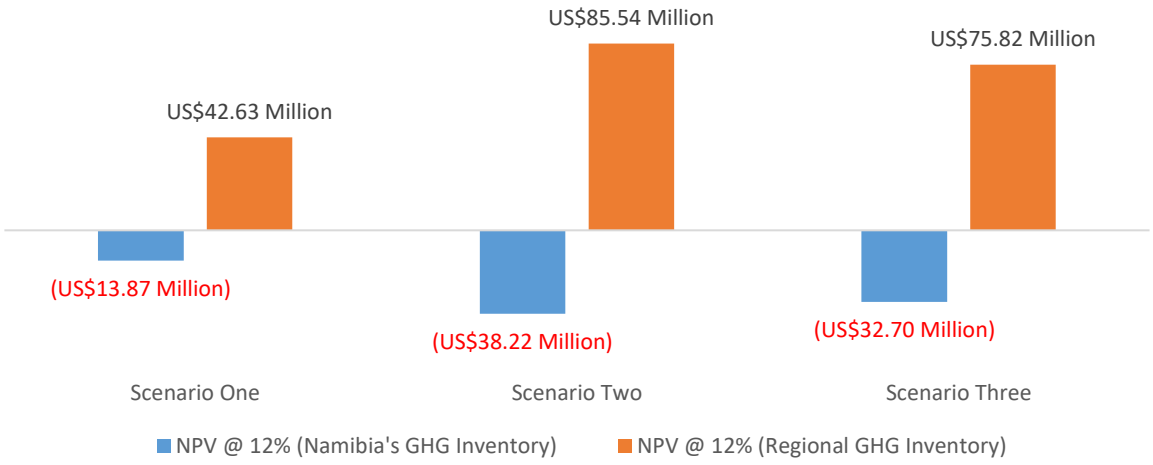


Substantial regional social benefits can be expected by the reduction of truck traffic as regional traffic is diverted to the proposed railway line.

To quantify regional benefits, CO_2E social costs per truck and train Tonne-KM were calculated at US$0.00282 and US$0.001019, respectively. This implies a 2.8x truck-to-train GHG social cost factor.

Using this social cost factor, Figure ES-6 summarizes the net present value of the region's GHG inventory in US dollar terms, discounted at a social rate of 12%. For interest, the net present value of Namibia's GHG inventory from Figure ES-5 is also shown.

Figure ES-6: Regional GHG Inventory by Scenario



Each trainload between Katima Mulilo to Walvis Bay carrying regional traffic reduces regional truck traffic by 51 trucks. While the TZR will increase Namibia's GHG inventory, the region stands to benefit from a reduction in GHGs by having significantly fewer trucks on the road.

Environmental and Social Scoping Assessment

The methodology for conducting the scooping assessment involved desktop study of available publications for the study area, and the Preliminary Environmental Impact Assessment for the Katima – Cape Fria Railway Line and available aerial photography.

Interactions were held with other key experts in the Consultant team to share information about project impacts. Recommendations made as part of the scoping assessment include the next steps required to complete the Environmental and Social Impact Assessment (ESIA) and Environmental and Social Management Plan (ESMP).

Table ES-10 on the following page summarizes the major environmental and social impacts for the proposed TZR and related mitigation measures.

Table ES-10: Major Identified Environmental and Social Impacts and Mitigation Measures

Impact	Mitigation
Land Clearing Clearing of land in the state forest and conservation areas for railway reserve, access roads, bridges, borrow pits, cuttings, and construction camps etc, causing: Loss of biodiversity (range restricted, endemic, protected plant species) Loss of habitat for wildlife Habitat destruction is particularly of concern in the protected areas, and along the Kwando, Zambezi and Okavango River crossings. At this stage, the state of the vegetation and habitat is unknown where the crossings are being proposed but may be of significance. The Zambezi crossing is not included in this route but is implicated due to the proposed route.	Involve a botanist and ecologist to assist in the detailed alignment across the rivers and elsewhere along the route where there is sensitive habitat Use existing corridors and already cleared areas where possible Exercise strict control to remove only the necessary plant cover during construction Work with communities to fully utilise the wood resources removed from the area According to IFC/Word Bank Standards, a Critical Habitat assessment will be required for the protected area.
Construction Activities Uncontrolled, indiscriminate, or unplanned construction activities, or illegal activities done by the construction teams, will cause unnecessary negative impacts on the ecology and on livelihoods.	Irreparable damage from construction activities can be avoided and managed through a thorough ESMP implemented throughout all phases of the project. There should be Environmental Control Officers appointed for the duration of the construction contract The Contractor needs to prove its compliance history on other projects and should have a reputation of dealing with a large contract of this nature

Water Resources Large volumes of water are required for the construction phase. In previous projects of similar nature in rural communities, the following issues became apparent: • Political pressure to maintain water points that have been created temporarily for construction, so that they become permanent features, and attract human settlement in areas that should be left natural • Borehole yields being exceeded affecting the resources of farm owners and their livelihoods	Hydrological studies need to be done to identify sustainable water sources, and to use existing water points where possible
Wetland Dynamics Railway constructoin and operating activities may have adverse effects on wetland dynamics, especially interference with episodic high flows at the Kwando River crossing . This impact may occur when water flow is restricted at the river crossing, through the provision of too little culverts or culverts misplaced across the main river and its flood plains. Cutting off seasonal water flow from the flood plains would negatively influence the ecology of such systems.	Involve a hydrologist when developing the full ESIA to assess the effectiveness of the structures at the river crossings, to accommodate the flow dynamics of the rivers.
Community Access to Water Communities were previously concerned that the railway line will cut them off from direct access to water points. A water point on one side of the railway line will make it difficult and dangerous for both people and livestock to cross the line to reach the water point on the other side of the line. They also fear that this may lead to both human and livestock casualties. Their concerns are valid. In cases where the railway line influences the social catchments of water points, it is important that the water point then be modified to provide water on both sides of the line.	Concerns regarding community access to water need to be studied in greater depth for each area affected along the route, with crossings, water points and other solutions tailor made in consultation with the affected communities
Wildlife Corridors in the Zambezi Region It is a concern that the raised railway line will disturb or cut off altogether the existing wildlife corridors that exist for larger mammals especially elephants, particularly in the Bwabwata National Park. It is known that animals move freely from north to south across the existing national road through the Zambezi region where the railway line will be routed.	The preliminary design has accounted for 'eco-crossings' so that wildlife can continue to move between north and south of the alignment in the Zambezi region At the full ESIA stage, the matter would need to be further investigated with the

Unlike the level crossing of the road, the railway line will create a raised barrier. There may be a slight chance of animal-train collisions, but the priority concern is that the raised barriers inhibit the free crossing of the animals across the transport corridor.	required expertise to to confirm the design, number and placement of such crossings to be included in the final designs
Land Acquisition and Resettlement Stakeholders and communities are naturally always concerned that many households will be displaced to make way for the railway line. From experience, communities are of the opinion that families affected in this way should be compensated in such a manner that they are in the same position as before the development.	Considering the state's positive experience with resettlement compensation on road projects, land acquisition and resettlement for the proposed TZR should not be an issue so long as mitigation measures are in place The very first mitigation process is clearly communicating and disseminating project information regarding land requirements and resulting compensation to the community
Employment The project is likely to yield much needed employment opportunities in the midst of a national economic slump. Very little formal opportunities are available in most rural villages, settlements, and towns. However, people are afraid that the work will not be labour based/maximised or that it may be given to people from outside their areas and that they will not benefit from it in a significant way. Labour influx is a well-known problem on large projects and may also occur on this project in case significant external labour is allowed. Closely related to outside influence on cultural norms and values, people are worried that social ills such as crime and violence, alcohol abuse and commercial sex work or sexual contact with outsiders will increase because people from outside whom they do not know will come into their areas. The unemployed youth may be the most vulnerable to come under bad influences. With this concern can be added the potential spread of HIV/AIDS and other diseases.	To ensure the maximum benefit in terms of employment and secondary opportunities are offered to the local communities and to avoid outside influence, it is recommended that the project be mostly labour-maximised.
Built Heritage and Cultural Sites People from the affected communities feel very strongly about their graveyards and individual graves and in the previous study people in the Zambezi Region indicated that these sites should be avoided at	• With the avoidance of denser settled areas, grave sites will also need to be avoided • During the ESIA, affected communities need to be consulted about the localities of potential grave sites

all costs and that they will not accept any compensation for it – grave sites may not be touched.	

Next Steps in Environmental and Social Planning and Management

This environmental and social assessment is preliminary in nature and while most of the information is inherently true and the principles relevant, it will have to be refined and updated. Control measures need to be spelt out and made mandatory for the contractor and the operation and maintenance team to ensure the project brings mostly benefits to Namibia and does not bring the affected society and its environment into an environmental deficit.

Legal Assessment

A legal and regulatory assessment was conducted to ensure that the project is developed and procured in accordance with local (current) legal requirements. The following legislation and policies were reviewed and may impact the framework under which the project is to be developed and procured.

National Transport Services Holding Company Act, 28 of 1998 (the "Holding Company Act")

The Holding Company Act serves to provide for the incorporation of a holding company, in this instance, TransNamib Holdings Limited ("TransNamib"), to undertake, either by itself or through any subsidiary company, transport services in Namibia or elsewhere.

The Holding Company Act serves as sole legislation regulating rail in Namibia and confirms the establishment of TransNamib as a self-regulating body in respect of management, safety, operations, accident, and incident investigations and as the sole provider of rail transport services in Namibia

TransNamib has the power to enter into an agreement with any person, organisation or authority to perform a particular act or to render a particular service on behalf of or in favour of or to the benefit of TransNamib if it considers it necessary for the efficient performance of any act or service so contemplated.

Statutorily TransNamib will play a significant role in the planning, design, construction, maintenance, control and development of the Trans-Zambezi Railway Corridor notwithstanding the fact that railway vests in the State.

The 2018 Namibian Transport Policy

In terms of the 2018 Namibian Transport Policy, the current rail management arrangement is not compliant with administrative law, as TransNamib is a functionary in the areas of railway operations and management, as well as responsible for oversight of these activities.

As part of its development strategy, the Policy suggests a separation of infrastructure (retained with government) from operations (engaging private operators).The Policy suggests that an institutional restructuring of the present rail sector is needed, which will be linked to the legislative changes, to provide for among other things, open network access.

The Public Private Partnerships Act 4 of 2017

The Public Private Partnerships Act (the "**PPP Act**") in 2017, advances the Government's stated policy objective of providing the principles, framework and guiding procedures in

applying PPPs across Namibia.[1]

The PPP Act applies to the initiation, preparation, procurement, management, and implementation of PPP projects.

In terms of the PPP Guidelines, a PPP will be based on the following essential elements:

i) a contractual arrangement
ii) substantial risk transfer, and
iii) outcome-based financial rewards to the private sector.

Furthermore, the principle features of PPP include the provision of a service that will involve the creation or use of an asset involving private sector participation, a contribution by the State through for instance land, capital works, risk sharing, revenue diversion, purchase of the agreed services or other supporting mechanism; and the private sector receiving payments from government and/or through user charges or third party revenues that will be contingent on the private sector's performance in supplying the related services or facilities.

PPP Entity

The PPP Act is silent on how to constitute PPP entity. Specifically, the PPP Act does not stipulate how the relationship should be put together i.e., by way of JV (incorporated or unincorporated), SPV or otherwise.
However, this does not mean that a PP entity may not be constituted but rather, some flexibility is provided for in the design of the corporate structure for a PPP project.

The PPP Act does not make provision for a closed set of categories or circumstances under which PPP as a procurement method must be preferred. Rather, during the procurement options analyses stage, the Ministry of Works and Transport will be tasked to verify the project characteristics to ascertain the suitability of PPP per se as a procurement option. It is only during the feasibility stage that the precise delivery mechanism will be addressed.

The Public Procurement Act (the "PPA")

PPP Exemption under the PPA

There is no need for PPP exemption from the provisions of the PPA. Either of the two statures will apply, depending on the procurement method that is chosen.
If the Project is identified as a PPP, the Central Procurement Board of Namibia will not have statutory power to deal with the project. That will be left for the PPP Unit as it has the statutory mandate to deal with PPPs

The PPA sets forth the statutory framework for all procurement of goods, works and services and disposal of assets undertaken by the Central Procurement Board of Namibia (the "Board") or a public entity.

The Minister of Finance may determine the policy on procurement, including procurement preferences, classification and categories of Namibian manufacturers, suppliers, contractors and service providers and the terms and conditions for classification or participation in the procurement process.

[1] *See* Namibia Public Private Partnership (PPP) Policy, Ministry of Trade and Industry at Section 1.

Expropriation under the Namibian Constitution

Rights of ownership are guaranteed under the Namibian constitution. In terms of article 16 (1) of the Constitution, all persons shall have the right in any part of Namibia to acquire, own and dispose of all forms of immovable and movable property individually or in association with others and to bequeath their property to their heirs or legatees: provided that Parliament may by legislation prohibit or regulate as it deems expedient the right to acquire property by persons who are not Namibian citizens.

In the Namibian context the legal authority to expropriate is provided for in article 16(2) of the Namibian Constitution. The article empowers the state, or any competent body or organisation authorised by law, to expropriate property in the public interest subject to the payment of just compensation. So accordingly, the requirements of expropriation involve public interest and just compensation authorised by law. Expropriation may be consensual or where necessary forced. Forced expropriation is only possible in matters involving land rights.

The Environmental Management Act 7 of 2007

The Environmental Management Act 7 of 2007 ("the EMA") came into operation on 06 February 2012.[2] It is accompanied by two sets of regulations. The first set of regulations lists the activities that may not be conducted without an environmental clearance certificate,[3] published in terms of section 27 of the EMA. The second set deals with Environmental Impact Assessments ("the EIA Regulations") and was published in terms of Section 56 of the EMA.[4] The State is also bound by the EMA.[5]

The purpose of the EMA is "*To promote the sustainable management of the environment and the use of natural resources by establishing principles for decision making on matters affecting the environment; to establish the Sustainable Development Council; to provide for the appointment of the Environmental Commissioner and environmental officers; to provide for a process of assessment and control of activities which may have significant effects on the environment; and to provide for incidental matters*."

Against the above purpose of the EMA, the object of EMA is to prevent and mitigate, on the basis of the principles of environmental management, the significant effects[6] of activities on the environment.[7] This is to be achieved by ensuring that the significant effects of activities on the environment are considered in time and carefully, ensuring that there are opportunities for timeous participation of interested and affected parties throughout the assessment process and finally ensuring that the findings of an assessment are taken into account before any decision is made in respect of activities.[8]

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2 GN 28 of *GG* 4878 of 06 February 2012.
3 The Regulations published in GN 29 of *GG* 4878 of 06 February 2012.
4 The Regulations published in GN 30 of *GG* 4878 of 06 February 2012.
5 Section 55 of the EMA.
6 "Significant effect" means having, or likely to have, a consequential qualitative or quantitative impact on the environment, including changes in ecological, aesthetic, cultural, historic, economic and social factors, whether directly or indirectly, individually or collectively. See section 1 of the EMA.
7 Section 2 of the EMA.
8 Section 2 of the EMA.

1 Introduction

1.1 Authority Of Assignment

This study is being undertaken under the authority of a contract signed between the Ministry of Works and Transport (MoWT), Government of Republic of Namibia (i.e., the 'Client') and M R Technofin Consultants Ltd. (MRTCL) (i.e., the 'Consultant') on March 10th, 2021 (Contract No. MWT/TIIP/ISCB/20/05). MRTCL is leading a consortium with Burmeister & Partners (Pty) Ltd., University of Cape Town, Enviro Dynamics, Koep & Partners, and 3TI Progetti.

1.2 Objectives Of the Assignment

The overall objective of the assignment is to 'research and analyse data and information pertaining to the Trans-Zambezi Railway extension of Grootfontein-Rundu-Katima Mulilo and provide to the Ministry of Works and Transport, adequate strategic, economic and technical information on the project feasibility'.

The proposed Trans -Zambezi extension from Grootfontein - Rundu - Katima Mulilo will directly link the Namibian Railways with Zambia while also facilitating connectivity with Angola, Botswana and the Southern Democratic Republic of Congo (DRC). Securing Namibia's position as a regional hub is the main motivating objective for this study, with expectations that the Trans-Zambezi extension will spur trans-border to/from Walvis Bay from neighbouring countries and to give effect to Namibia's Vision 2030 to become the transport hub for land lock countries.

1.2.1 Specific Objectives of The Study

The specific objectives as per Section 2.2 of the Terms of Reference are as follows:

a) Assessment of regional railway infrastructure development projects in Zambia, Angola and Botswana through consultations with relevant Authorities and Institutions in the neighbouring countries
b) Evaluation of the project transport demand: key users, commodities, annual freight volumes, transport prices, competing routes and modes.
c) Evaluation of alternative options for achieving the regional railway interconnection from Namibia and identification of the most favourable route. Elaboration of appropriate project implementation plan and financing.
d) Assessment of multimodal road + rail alternative
e) Determination of the viability for the development of the Trans-Zambezi Railway Corridor

1.3 Progress Made and Reports Submitted

1.3.1 Inception Report

The Consultant's team of experts was mobilized and the 'Kick Off' meeting for this study was held on 13th April 2021 at 14h00 Namibia time through Zoom video conference. This meeting was attended by the MoWT officials and the Consultant's team. The Consultant made a detailed 'Kick Off Presentation' to the attendees and the feedback from the ministry was noted. The 'Draft Inception Report' was submitted on 12th April 2021. Based on comments

received from MoWT on 20th April 2021, the 'Revised Inception Report' was submitted to the Client on 30th April 2021.

1.3.2 Inception Report Workshop

A 'Workshop' on the Inception Report was conducted on 11th May 2021 by the Consultant, which was attended by MoWT officials and other stakeholders from Transnamib and others. Based on the observations received from MoWT on 14th May 2021, the Consultant made appropriate modifications and minor changes in the report. The 'Final Inception report' was submitted on 26th May 2021, and was accepted/approved by MWT

1.3.3 Engineering Working Paper

As an 'Interim' deliverable, the Consultant submitted an 'Engineering Working Paper' on 29th July 2021. The purpose of the Paper was to provide details of the design criteria and recommendation of railway route for Trans Zambezi Railway extension.

1.3.4 Workshop on Route Finalization

A 'Workshop' on the 'Route Finalization Discussion' was conducted on 1st September 2021 by the Consultant, which was attended by MoWT officials and other key stakeholders, and detailed deliberations were held. Further comments and observations were received from MoWT on 13th, 14th & 15th September 2021 on 16th September 2021. The Consultant responded to all the observations in a consolidated manner and key issues were further dealt with in the Travel Demand Model report.

1.3.5 Travel Demand Report – Vol I. Route Options Assessment

The Consultant's team prepared and submitted the first volume of the second milestone deliverable for the assignment – the Travel Demand Report – Vol I. Route Options Assessment on October 20th, 2021. The Report describes, in detail, the design basis for the proposed Trans-Zambezi railway line as well as potential route options that were assessed towards arriving at the recommended route.

Vol I. also includes a companion report which details the anticipated land acquisition and resettlement costs and how they were calculated.

1.3.6 Travel Demand Report – Vol II. Trans-Zambezi Railway Transport Volume Estimation

The Consultant's team prepared and submitted the second and final volume of the second milestone deliverable for the assignment – the Travel Demand Report – Vol II. Trans-Zambezi Railway Transport Volume Estimation on October 29th, 2021. The report describes the freight traffic assessment for the Trans-Zambezi Railway line, which will inform the commercial assessment at the feasibility stage of this assignment.

1.3.7 Project Discussion Workshop with AfDB

A 'Workshop' on the overall project discussion with African Development Bank (AfDB) was conducted on 12th November, 2021 by the Consultant. The workshop was attended by by MoWT officials, the Walvis Bay Corridor Group, TransNamib and AfDB. Detailed deliberations included updating AfDB on the Consultant's route, technical and traffic assessment as well as the assignment's next steps. AfDB requested to have another workshop once the draft feasibility report was submitted (this report).

1.3.8 Field Mission Reports

On November 8th, 2021, the Consultant's team submitted field mission reports for Angola, Zambia and Botswana. The Field Mission Reports cover the outcomes of videoconference and in-person consultations in Angola, Zambia and Botswana as well as a summary of the data and documents reviewed as part of the mission.

1.3.9 Draft Feasibility Study Report

The Consultant's team prepared and submitted the milestone deliverable for the assignment – the Draft Feasibility Study Rport – Vol I, Vol II & Vol III on January 7th, 2022. The Report describes, in detail, the design criteria and preliminary design for the proposed Trans-Zambezi railway line recommended route.

1.3.10 Draft Feasibility Study Report Workshop

A 'Workshop' on the Draft Feasibility Report was conducted on 17th Feb, 2022 by the Consultant, which was attended by MoWT officials and other stakeholders from TransNamib and others. Based on written observations received from MoWT on March 1st, 2022, the Consultant made appropriate modifications to the report. This report is the 'Final Feasibility report'.

1.3.11 Presentation to Honourable Minister and Senior Management

A 'Project Appraisal' presentation was made to the Honourable Minister of MoWT, Namibia and the CEO of TransNamib on March 9th, 2022. The work done on the project by the Consultant was well received and appreciated. The Minister emphasized the importance of the project for Namibia and the region and conveyed the Government of Namibia's resolve to proceed further with developing the Trans-Zambezi rail line.

1.4 Purpose of this Report

This report describes, in detail, the financial, economic and legal feasibility of implementing the project as well as the preliminary environmental impact assessment. The report concludes with action-oriented 'next steps' to carry the project forward. The structure of the report is as follows:

1.5 Structure of this Report

In order to keep the Final Feasibility Study Report handy and easy to read, the Report has been spilt into Three distinct sections as follows:

→ **Vol I. - Preliminary Design Report**

→ **Vol II. – Project Feasibility**

→ **Vol III. – Project Drawings**

This document is 'Vol II. Project Feasibility' and is organized as follows:

Section 1 - Introduction

Section 2 - Traffic Background

Section 3 - Financial Assessment

Section 4 - Economic Assessment

Section 5 - Environmental and Social Scoping Assessment

Section 6 - Legal and Regulatory Assessment

Section 7 - Next Steps

(A) Vol I. – Preliminary Design Report broadly consists of:

(1) Railway Design Criteria

(2) Project Engineering

(3) Structures

(4) Stations

(5) Signal and Telecommunications

(6) Railway Operations

(7) Railway Asset Maintenance and Workshops

(8) Bill of Quantities & Cost Estimates

(B) Vol III. –Project Drawings consists of:

(1) Key Plan (Overall)

(2) Key Longitudinal Section i.e. Alignment Profile (Overall)

(3) Project Sheets - Detailed Plan and L Sections – 25 Km stretches each (31 Sheets)

(4) Typical Cross-section in Cutting & Filling

(5) Key Plan of Track Layout for Grootfontein Station

(6) Key Plan of Track Layout for Rundu Station

(7) Key Plan of Track Layout for Divundu Station

(8) Key Plan of Track Layout for Kongola Station

(9) Schematic Track Layout for Katima Mulilo Station

(10) Key Plan of Track Layout for Two Loop Line Station

2 Traffic Background

2.1 Introduction

This section revisits the freight traffic estimates that were developed in the Travel Demand Model Report (Vol II. Transport Volume Estimation) under various regional railway development scenarios. Based on the likelihood of regional railway developments to materialize – which were ascertained through consultations, the field mission and desk research – this section concludes with the scenarios that were selected for the financial and economic analysis.

2.2 Traffic Scenarios Revisited

The Consultant undertook to develop a list of railway rehabilitation and development projects in the SADC region that could materialize and potentially impact (positively or negatively), the Trans-Zambezi Rail's freight potential. These developments were ascertained through consultations, field missions and desk research. The findings are captured in Figure 2-1 on page 31.

Though railway rehabilitation and development projects in the region were identified, determining timelines was difficult as stakeholders were largely unsure themselves. Based on the stage at which a particular rail project was in development, the Consultant assumed an operational start year for the project. To this end, it was assumed that most projects in Figure 2-1 would be operational by 2027 (the same year in which the Trans-Zambezi line is expected to be operational).

To understand the potential of these regional railway developments on the proposed Trans-Zambezi Rail (TZR), scenarios were developed in the travel demand model which then provided a set of freight forecasts on the TZR, based on other regional railway developments coming into the fore. These scenarios are summarized in the table below.

Table 2-1: Travel Demand Model Scenario Descriptions

Scenario Name/Number	Scenario Description
0	Existing 2019 Namibian Import, Export and Transit Volumes are modelled with no further regional traffic potential. Trans-Zambezi Rail and Benguela rail line are not implemented
1	Existing 2019 Namibian Import, Export and Transit Volumes are modelled with no further regional traffic potential. Trans-Zambezi Rail line is not implemented but the Benguela rail line is (following a successful tender for operating, maintaining and expanding the line).
2A	Interim improvements to the Trans-Zambezi corridor but no Benguela rail line.
2B	Interim improvements to the Trans-Zambezi corridor and a functioning Benguela line are modelled
3	The Trans-Zambezi Railway is built. Other regional rail network developments are also modelled
4A	The Trans-Kalahari Railway is built (but not the Trans-Zambezi). Other regional rail network developments are also modelled

Scenario Name/Number	Scenario Description
4B	Both Trans-Zambezi and Trans-Kalahari are built. Other regional rail network developments are also modelled
5	The Trans-Zambezi rail line is built. In addition, there is new freight generation in the region that could potentially be attracted to the line.
6A	Namibia and Zambia are connected by rail through the following network improvements/expansion: Zambian railway improvements to existing network Shesheke to Livingstone connection is added to the existing network The Trans-Zambezi Railway is built
6B	Namibia and Zambia are connected by rail through the following network improvements/expansion: Shesheke to Solwezi line is developed The Trans-Zambezi Railway is built
6C	Namibia and Zambia are connected by rail through the following network improvements/expansion: Shesheke to Livingstone connection is added Shesheke to Solwezi line is developed All other rail links necessary to connect to neighbouring rail networks are developed The Trans-Zambezi Railway is built
7	Botswana expands its rail network to develop a north-south connection to Zambia and South Africa the Trans-Zambezi Railway is built
8	Pro-rail policies adopted in the region The Trans-Zambezi Railway is built

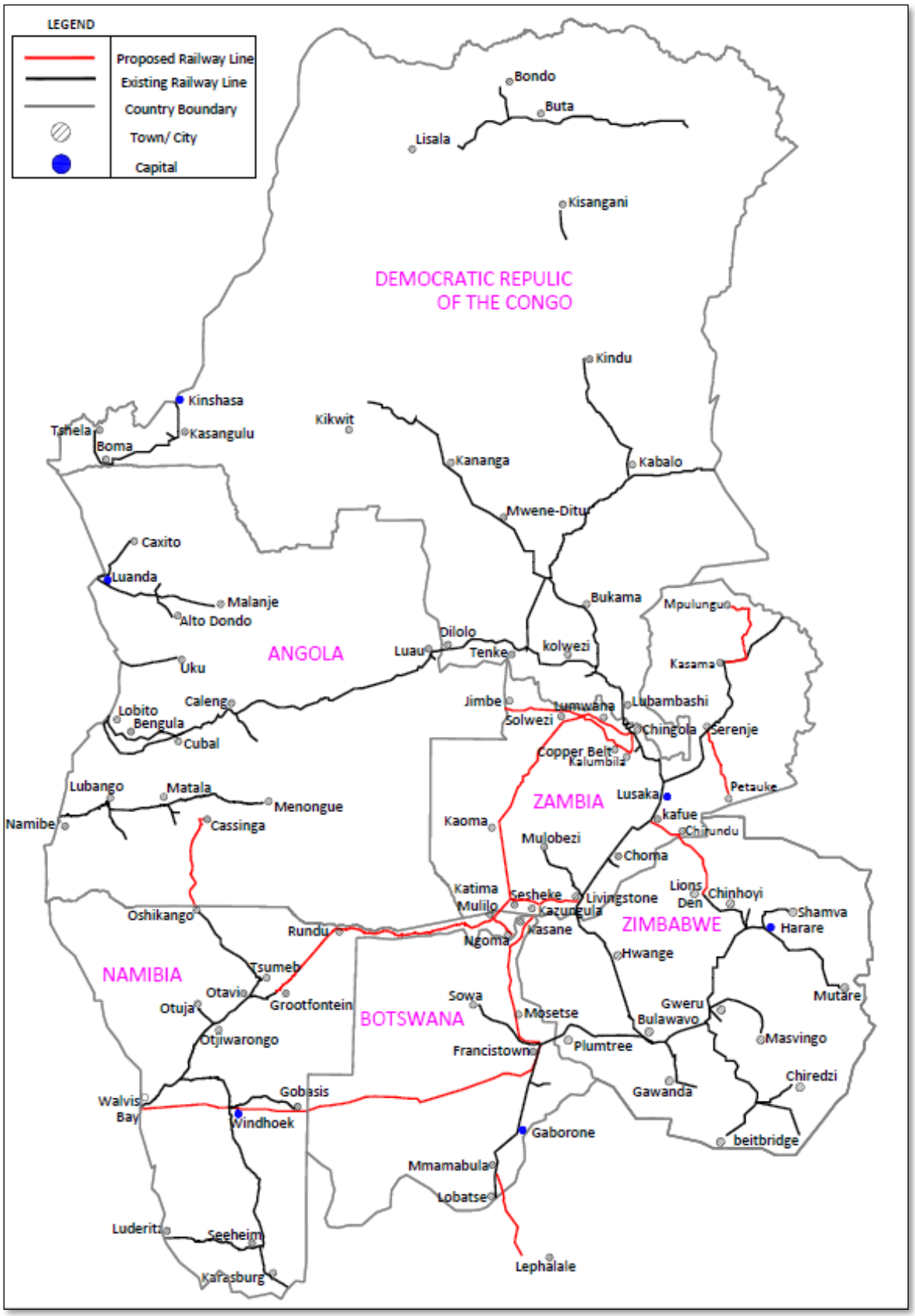
The modelling produced a set of freight forecasts by scenario which are summarized in the table below.

Table 2-2: Comparison of TZR Freight Volume Projections over all Scenarios

Scenario Analysis/ Number	Central growth projection volumes (Million Tons per Year – Both Directions – Cumulative for the entire Line)				
	2027	**2029**	**2039**	**2049**	**2069**
3	4,65	4,93	7,04	10,08	20,67
4B	4,24	4,50	6,42	9,17	18,82
5	4,75	6,16	22,32	31,91	65,53
6A	9,14	9,71	14,14	20,58	43,42
6B	8,70	9,02	12,93	18,53	38,01
6C	8,58	8,96	12,76	18,19	37,17
7	4,07	4,31	6,06	8,55	17,18
8	7,82	8,30	11,91	17,16	35,59

Note: Scenario 0,1, 2A/B, and 4A are not shown here as it is assumed that the TZR is not built in these scenarios.

Figure 2-1: Regional Rail Network (Current and Planned)

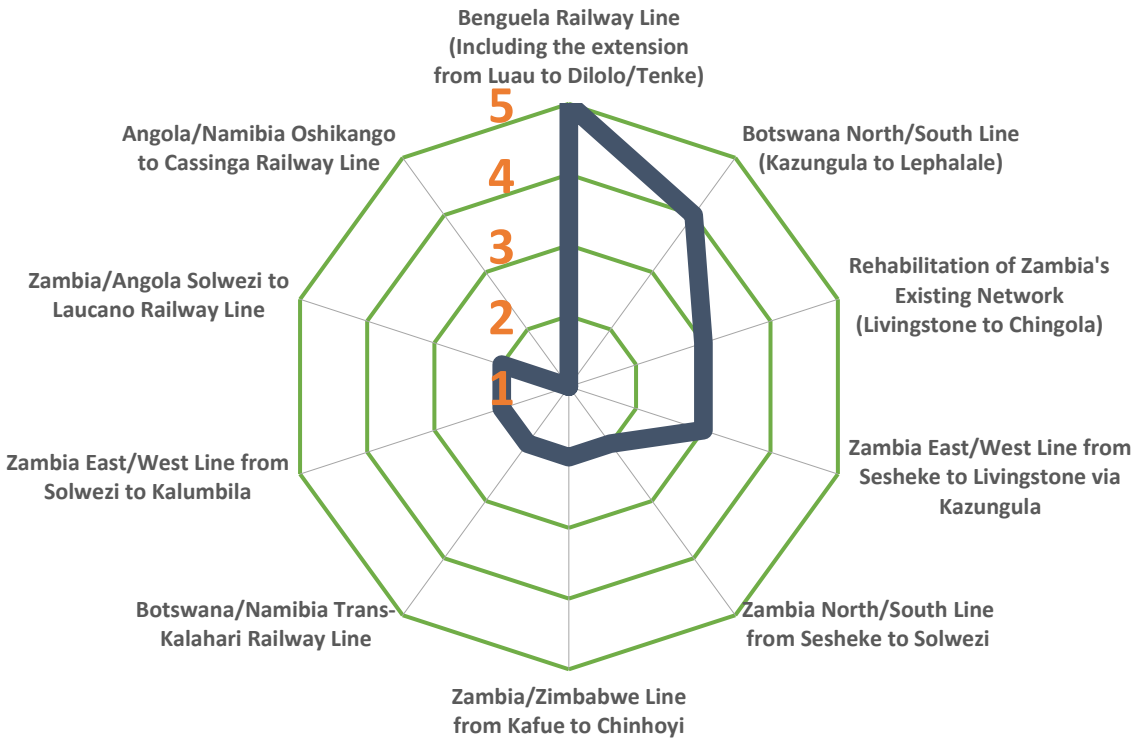


2.3 Scenarios Carried Forward

Each of the regional railway development projects captured in Figure 2-1 was qualitatively assessed and given a score on the likelihood that it would be fully developed and become operational. A score of one meant a low probability of the project developing and a maximum score of five meant a high probability.

The qualitative assessment was based on in-depth consultations with transport authorities in neighbouring countries and the scoring is provided. See Figure 2-2 below. Railway developments that had activities such as (pre)feasibility studies completed or were in the process of being contracted for construction were given a score of three or better.

Figure 2-2: Scoring Regional Railway Developments (1 = low probability of developing, 5 = high probability of developing)



Note: The Trans-Zambezi Rail is not shown in the above figure as it is assumed to be built

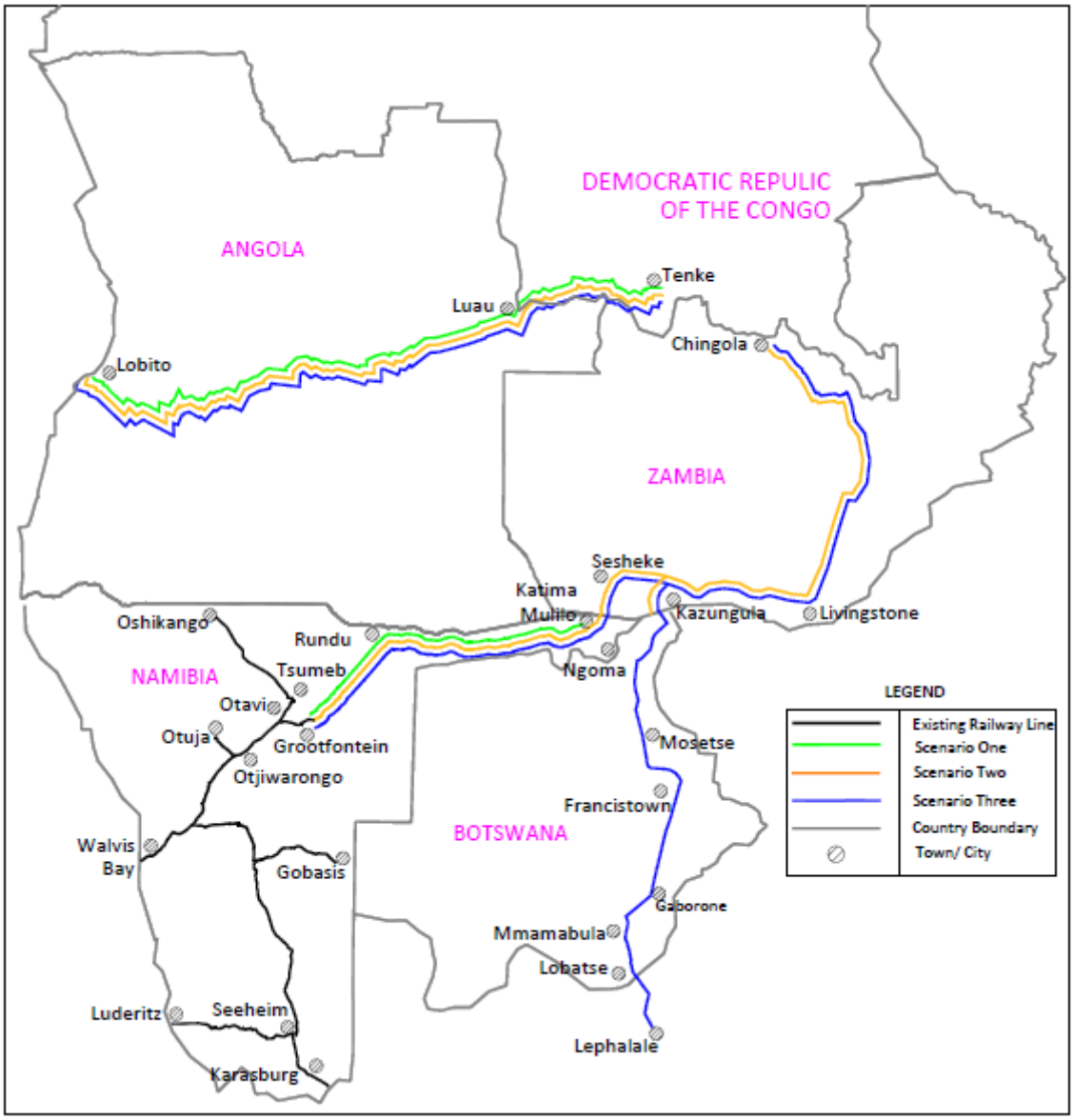
Projects that scored three or higher were carried forward for analysis in the financial and economic chapter. The table and figure that follow summarize the scenarios that were carried forward.

A summary of freight forecasts for the scenarios mentioned below can be found in Appendix A.

Table 2-3: Railway Development Scenarios Carried Forward

Updated Scenario #	Trans-Zambezi Rail is built	Benguela Line (including extension from Luau to Dilolo/Tenke) is successfully tendered	Zambia's existing network from Livingstone to Chingola is rehabilitated	Zambia East/West line from Sesheke to Livingstone via Kazungula is built	Botswana North/South Line (Kazungula to Lephalale) is built
Primary Funding Responsibility	Namibia	Angola	Zambia	Zambia	Botswana
1	Included	Included	Not Included	Not Included	Not Included
2	Included	Included	Included	Included	Not Included
3	Included	Included	Included	Included	Included

Figure 2-3: Railway Development Scenarios Carried Forward



3 Financial Assessment

3.1 Introduction

The purpose of this section is to assess the financial viability of the proposed TZR by testing various project structures with private sector participation. The objective of this section is to propose a structure that is commercially attractive (i.e., can be successfully tendered under a Public-Private Partnership framework) while also delivering value-for-money for MoWT.

3.2 Approach

The financial assessment is grounded on a discounted project-level cash flow analysis using the Microsoft Excel backbone. Specifically, elements from other sections of this feasibility report such as traffic estimates, infrastructure expenditures and rolling stock requirements/procurement were used to develop a rail operating model.

Note on Modeled Exchange Rate

The financial assessment is conducted in United States Dollars. Where required, an exchange rate of 0.063 NAD/USD is used.

Unit cost estimates were then applied to outputs of the operating model (e.g., gross-ton km per annum, rolling stock km per annum, etc.) to arrive at operating, maintenance and management expenditures for rail infrastructure and operations, separately. These costs were forecasted and compared against forecasted revenues and capital expenditures to determine the project valuation.

The financial model was then fine-tuned by assigning development, management and operating responsibilities between the public and private sector to arrive at suitable commercial structures that could be tendered.

3.3 Tariff Estimate

The basis for estimating the tariff for the proposed TZR is TransNamib's existing tariff card. Specifically, a review of TransNamib's annual revenues and tonnage hauled indicated at tariff of N$0.67 per ton-km in 2019. Converting this into USD using the average 2019 exchange rate and applying an inflation factor, the base tariff assumed for the financial assessment is US$0.048 per ton-km.

3.4 Capital Costs

Upfront capital costs to develop the railway line (mainline, stations, workshops, signal & telecom) are taken from Section 13 of Volume I.

Assuming that the railway line is built over four years, Table 3-1 summarizes the construction-period disbursement schedule. Note that it is assumed that 2022 will include pre-construction activities (detailed design and funding mobilization) with construction commencing in 2023.

Table 3-1: Construction Disbursement Schedule (US$ Millions, 2021 prices)

Expenditure Item	Expenditure Amount (USD Millions, 2021 prices)	1-Jan-23	1-Jan-24	1-Jan-25	1-Jan-26
		31-Dec-23	31-Dec-24	31-Dec-25	31-Dec-26
Permanent Way and Formation	1,374.78	343.70	343.70	343.70	343.70
Structures	440.52	110.13	110.13	110.13	110.13
Workshop, Tools & Plants, and Electrical	63.70	0.00	0.00	31.85	31.85
Signal & Telecommunication	128.13	0.00	0.00	32.03	96.09
Preliminaries, Contingencies and Project Management	223.97[1]	55.99	55.99	55.99	55.99
Land Acquisition & Resettlement	35.24	35.24	0.00	0.00	0.00
Total	2,266.34	545.06	509.82	573.70	637.76

1. Includes provisions for design and construction
Note: Figures may not add up exactly due to rounding

3.4.1 Depreciation and Renewals/Upgrades

Depreciation assumptions for major capital cost items are summarized in Table 3-2 below.

Table 3-2: Infrastructure Depreciation Assumptions

Capital Item	Depreciation (Years)
Permanent Way and Formation Useful Life	50
Structures Useful Life	100
Workshop, Tools & Plants and Electrical Useful Life	50
Signal & Telecommunication	20
Preliminaries, Contingencies and Project Management Useful Life	20
Land Acquisition & Resettlement Useful Life	0

3.4.1.1 Capital Renewals and Upgrades

Capital renewals in the model are triggered when a capital item reaches the end of its useful life. The renewal expenditure is based on the related expenditure estimate made upfront and indexed to inflation.

Capital upgrades will be required to meet increases in traffic. For modeling purposes, upgrade expenditures are accounted for in the yearly infrastructure maintenance costs which are discussed below.

Note on Taxes

Upfront capital costs to develop the railway line exclude import duties[A] and the Value-Added-Tax (VAT). In certain circumstances, the Namibian Revenue Agency may grant VAT exemptions for infrastructure projects.

In other instances, the responsible ministry may have to pay taxes directly, though financing may be raised for the project itself (i.e., financiers will not pay the tax). For this analysis, we have assumed that the capital would not bare the VAT charges. Rather, the MoWT will pay the VAT separately.

We have assumed that VAT will be charged on rolling stock and that this would be borne by the project. The rationale is that if a **private** operator conducts rail operations on the line, it would procure the required rolling stock and would not benefit from a VAT exemption.

A. No duties are levied on imports between SADC countries, and it is likely that most imported rail materials will be come from South Africa. Furthermore, given the magnitude and financial quantum of the project, volume discounts on materials can be expected which would compensate for the 5% import duty.

3.5 Rolling Stock Procurement

Locomotive and wagon requirements can be found in Section 12 of Volume I. Table 3-3 summarizes the rolling stock procurement schedule over the forecast period.

Table 3-3: Rolling Stock Procurement Schedule (Quantities include Maintenance Provisions)

	1-Jan-26	1-Jan-31	1-Jan-41	1-Jan-51	1-Jan-61	1-Jan-66
Scenario 1						
Locomotive Procurement	36	5	14	19	18	11
Wagon Procurement	527	264	398	604	417	298
Scenario 2						
Locomotive Procurement	48	20	31	45	29	23
Wagon Procurement	1044	539	823	1272	883	633
Scenario 3						
Locomotive Procurement	42	18	26	39	20	26
Wagon Procurement	880	455	698	1078	750	537

Rolling stock acquisition costs are summarized in Table 3-4 below. The acquisition costs include VAT. Import duties are not applicable.

Table 3-4: Rolling Stock Acquisition Price (2021 Price)

Item	Assumption
Price per Locomotive	US$ 5.75 million
Price per Wagon	US$ 104k

3.5.1 Rolling Stock Depreciation & Maintenance Provisions

Rolling stock depreciation and maintenance provisions are summarized in Table 3-5. The maintenance provisions account for the additional locomotives and wagons that are required as excess capacity that would become available as other rolling stock is removed from service for maintenance.

Table 3-5: Rolling Stock Depreciation and Maintenance Provision Assumptions

Item	Assumption	Comment
Locomotive Useful Life	30	Years
Wagon Useful Life	30	Years
Locomotive Fleet Maintenance Provision	10.00%	%
Wagon Fleet Maintenance Provision	4.00%	%

3.6 Annual Cost Assumptions

Two main 'cost heads' are attributed to the annual costs related to managing railway infrastructure as well as freight operations. Such annual costs are reflected in the income statement.

The two cost heads are:

1. **Infrastructure Management and Fixed Asset Maintenance Costs –** These costs are related to annual expenditures required to keep the railway's fixed infrastructure in operating condition. For example, annual expenditures towards maintaining track, structures and control systems would be considered as an infrastructure management cost. Costs related to managing railway infrastructure (i.e., infrastructure administration) are also considered an infrastructure management cost.

2. **Railway Operations and Rolling Stock Maintenance Costs** – These costs include annual expenditures related to actual railway operations including crew and fuel costs and rolling stock maintenance.

Assumptions regarding both are summarized below and are based on the Consultant's expertise in and judgement of Namibia's rail network and operations and other networks in the region.

3.6.1 Infrastructure Management and Fixed Asset Maintenance Costs

Per annum cost assumptions are summarized in Table 3-6. As discussed in Section 3.4.1.1, per annum maintenance costs include a provision for capital upgrades to meet the increasing traffic requirements.

Table 3-6: Infrastructure Management and Fixed Asset Maintenance Cost Assumptions

Cost Item	Assumption	Comment
Insurance	1.00%	% Of Gross Fixed Asset Cost per Annum
Infrastructure Administration (Management, Commercial)	1.420	US$ Millions (2021 prices)
Permanent Way and Formation Maintenance Cost	0.004	USD per Gross Tonne-KM per Annum
Structures Maintenance	2.0%	% Of Component's Gross Fixed Asset Cost per Annum
Workshop, Tools & Plants and Electrical Maintenance	5.0%	% Of Component's Gross Fixed Asset Cost per Annum
Signal & Telecommunication Maintenance	5.0%	% Of Component's Gross Fixed Asset Cost per Annum

3.6.2 Railway Operations and Rolling Stock Maintenance Costs

Railway operations and rolling stock maintenance cost assumptions (per annum) are summarized in Table 3-7.

Table 3-7: Railway Operations and Rolling Stock Maintenance Cost Assumptions

Cost Item	Assumption	Comment
Crew Costs		
Locomotive Crew Cost	0.075	US$ Millions per Crew (2021 prices)
General Expenses		
Insurance	1.00%	% Of Gross Operating Asset Cost
Operational Administration	1.265	US$ Millions (2021 prices)
Operating Expenses		
Fuel Price (Before Fuel Levy Refund)*	0.982	USD/Liter (2021 prices)
Fuel Price Refund Percentage*	9.02%	% Of Fuel Price
Fuel Price (After Fuel Levy Refund)*	0.893	US$/Liter (2021 prices)
Locomotive Maintenance Cost	1.700	US$/Locomotive-KM (2021 prices)
Freight Wagon Maintenance Cost	0.080	US$/Wagon-KM (2021 prices)

*Note: The Road Fund Administration refunds the fuel levy (currently N$1.48 per litre of diesel or fuel) to 'off-road' users such as rail, maritime, construction and agriculture sectors. It is the Consultant's understanding that TransNamib is refunded 95% of the fuel levy.

3.7 Other Assumptions

3.7.1 Timing

Table 3-8 below summarizes the main timing assumptions in the model.

Table 3-8: Model Timing Assumptions

Timing Item	Assumption	Comment
Model Start Date	01-Jan-22	Date
Model End Date	31-Dec-69	Date
Pre-Construction Duration	1	Years
Pre-Construction End Date	31-Dec-22	Date
Length of Construction and Commissioning	4	Years
Construction End Date	31-Dec-26	Date
Start of Operations	01-Jan-27	Date

3.7.2 Inflation

Revenues, capital and operating costs have been inflated at a rate of 5% for the first three years and then, by 3% for the remaining forecast period.

3.7.3 Taxes

The Value-added Tax is assumed to be 15% and tax on income is set at 32%.

3.8 Results and Sensitivities

The revenue and expense results by scenario are tabulated on page 40 and onward. The project internal rate of return (IRR) by scenario is summarized in Table 3-9 and is calculated based on the entire forecast period from 1-Jan-22 to 31-Dec-69. For ease, the table includes a map of the scenarios that were discussed in the previous section of this volume.

Table 3-9: Project Returns by Scenario

Scenario	Project IRR
One	5.9%
Two	9.7%
Three	9.1%

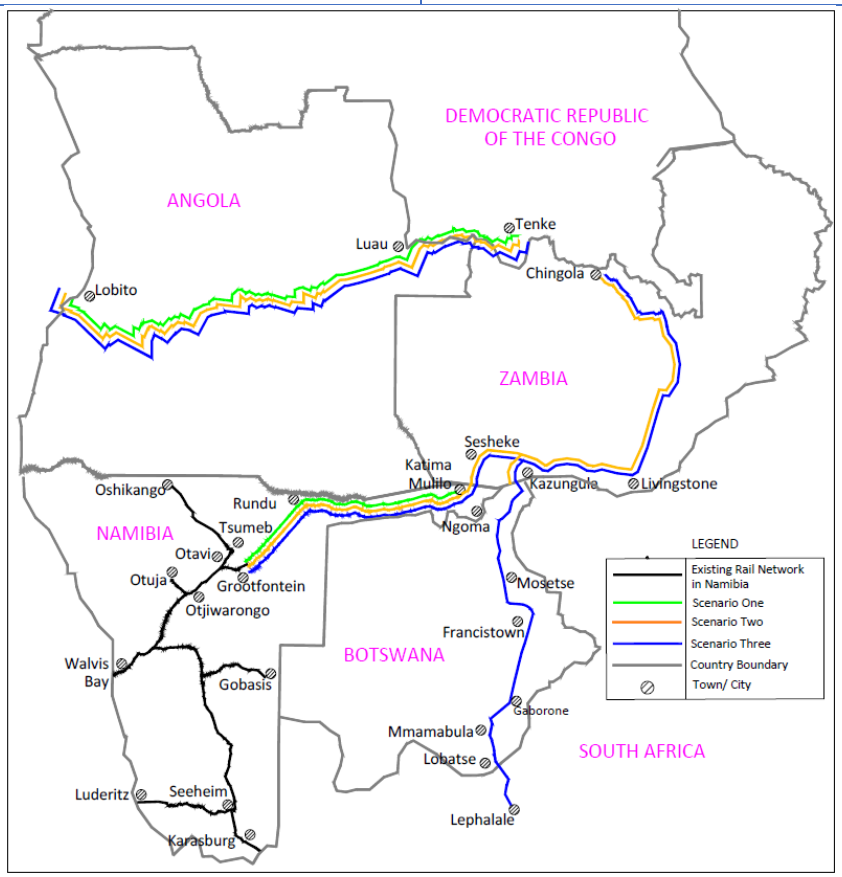


Table 3-10: Scenario One - Revenue and Expenses (US$ Million)

	31-Dec-27	31-Dec-32	31-Dec-37	31-Dec-42	31-Dec-47	31-Dec-52	31-Dec-57	31-Dec-62	31-Dec-67
Revenues	**66**	**299**	**415**	**574**	**797**	**1,102**	**1,523**	**2,115**	**2,947**
Railway Operating & Maintenance Costs									
Locomotive Crew Costs	1	4	5	7	10	14	20	28	41
Fuel Costs	5	23	32	46	64	91	129	183	260
Loco Maintenance	2	10	14	19	27	39	55	77	110
Wagon Maintenance	2	9	13	18	26	36	51	73	104
Insurance	4	6	7	12	14	28	57	91	121
Operational Administration	2	2	3	3	3	4	5	5	6
Total	**16**	**54**	**73**	**106**	**145**	**212**	**316**	**458**	**642**
Railway Infrastructure Management Costs									
Permanent Way and Formation Maintenance Cost	8	36	50	70	98	137	190	266	374
Structures Maintenance	13	15	18	20	24	27	32	37	43
Workshop, Tools & Plants and Electrical Maintenance	5	6	7	8	9	10	12	14	16
Signal & Telecommunication Maintenance	10	11	13	15	18	21	24	28	32
Insurance	34	39	45	52	68	79	91	106	146
Infrastructure Administration (Management, Commercial)	2	2	2	3	3	4	4	5	6
Total	**71**	**109**	**135**	**169**	**219**	**277**	**353**	**455**	**616**
EBITDA	**-22**	**136**	**206**	**300**	**432**	**612**	**854**	**1,202**	**1,689**
Depreciation	**63**	**65**	**65**	**69**	**58**	**63**	**63**	**68**	**71**
Income Before Taxes	**-85**	**70**	**141**	**231**	**374**	**549**	**790**	**1,133**	**1,617**
Taxes	**0**	**23**	**45**	**74**	**120**	**176**	**253**	**363**	**518**
Net Income / (Loss)	**-85**	**48**	**96**	**157**	**255**	**373**	**537**	**771**	**1,100**

Note: Figures may not add up exactly due to rounding

Table 3-11: Scenario Two - Revenue and Expenses (US$ Million)

	31-Dec-27	31-Dec-32	31-Dec-37	31-Dec-42	31-Dec-47	31-Dec-52	31-Dec-57	31-Dec-62	31-Dec-67
Revenues	**129**	**592**	**829**	**1,159**	**1,622**	**2,262**	**3,150**	**4,404**	**6,177**
Railway Operating & Maintenance Costs									
Locomotive Crew Costs	2	8	11	16	22	31	44	63	90
Fuel Costs	11	50	71	100	142	201	285	406	580
Loco Maintenance	5	21	30	42	60	85	121	172	245
Wagon Maintenance	4	20	28	40	56	80	113	162	231
Insurance	6	10	12	24	28	59	103	173	233
Operational Administration	2	2	3	3	3	4	5	5	6
Total	**29**	**111**	**154**	**224**	**311**	**460**	**671**	**980**	**1,385**
Railway Infrastructure Management Costs									
Permanent Way and Formation Maintenance Cost	16	74	104	146	205	287	403	567	801
Structures Maintenance	13	15	18	20	24	27	32	37	43
Workshop, Tools & Plants and Electrical Maintenance	5	6	7	8	9	10	12	14	16
Signal & Telecommunication Maintenance	10	11	13	15	18	21	24	28	32
Insurance	34	39	45	52	68	79	91	106	146
Infrastructure Administration (Management, Commercial)	2	2	2	3	3	4	4	5	6
Total	**79**	**147**	**189**	**244**	**326**	**428**	**566**	**756**	**1,043**
EBITDA	**21**	**334**	**486**	**691**	**985**	**1,375**	**1,913**	**2,668**	**3,750**
Depreciation	**63**	**65**	**65**	**69**	**58**	**63**	**63**	**68**	**71**
Income Before Taxes	**-42**	**269**	**421**	**622**	**927**	**1,311**	**1,850**	**2,599**	**3,678**
Taxes	**0**	**86**	**135**	**199**	**297**	**420**	**592**	**832**	**1,177**
Net Income / (Loss)	**-42**	**183**	**286**	**423**	**631**	**892**	**1,258**	**1,768**	**2,501**

Note: Figures may not add up exactly due to rounding

Table 3-12: Scenario Three - Revenue and Expenses (US$ Million)

	31-Dec-27	31-Dec-32	31-Dec-37	31-Dec-42	31-Dec-47	31-Dec-52	31-Dec-57	31-Dec-62	31-Dec-67
Revenues	**116**	**528**	**736**	**1,025**	**1,429**	**1,986**	**2,759**	**3,847**	**5,384**
Railway Operating & Maintenance Costs									
Locomotive Crew Costs	1	7	9	13	19	27	38	54	77
Fuel Costs	9	43	61	86	122	172	244	348	496
Loco Maintenance	4	18	26	36	51	73	103	147	210
Wagon Maintenance	4	17	24	34	48	69	97	138	198
Insurance	5	9	11	21	24	51	89	146	203
Operational Administration	2	2	3	3	3	4	5	5	6
Total	**25**	**96**	**133**	**193**	**268**	**395**	**577**	**838**	**1,190**
Railway Infrastructure Management Costs									
Permanent Way and Formation Maintenance Cost	14	65	91	128	179	250	350	492	693
Structures Maintenance	13	15	18	20	24	27	32	37	43
Workshop, Tools & Plants and Electrical Maintenance	5	6	7	8	9	10	12	14	16
Signal & Telecommunication Maintenance	10	11	13	15	18	21	24	28	32
Insurance	34	39	45	52	68	79	91	106	146
Infrastructure Administration (Management, Commercial)	2	2	2	3	3	4	4	5	6
Total	**77**	**138**	**176**	**226**	**300**	**391**	**513**	**681**	**936**
EBITDA	**13**	**293**	**427**	**606**	**861**	**1,201**	**1,669**	**2,328**	**3,258**
Depreciation	**63**	**65**	**65**	**69**	**58**	**63**	**63**	**68**	**71**
Income Before Taxes	**-51**	**228**	**361**	**536**	**803**	**1,137**	**1,606**	**2,260**	**3,187**
Taxes	**0**	**73**	**116**	**172**	**257**	**364**	**514**	**723**	**1,020**
Net Income / (Loss)	**-51**	**155**	**246**	**365**	**546**	**773**	**1,092**	**1,536**	**2,167**

Note: Figures may not add up exactly due to rounding

For each scenario, tariff revenues are sufficient to cover both infrastructure management and operating costs on a yearly basis.

The positive IRR for each scenario (see Table 3-9) indicates that over the forecast period, net project cash flows do cover capital costs and rolling stock procurement. However, certain risks certainly make it difficult to raise equity and financing through traditional means such as the capital markets. These risks are:

1. PPP development in Namibia's transport sector (and the country in general) is still in its nascency. A lacking positive track record would make it difficult to raise capital at reasonable rates.

2. The TZR is a Greenfield project with significant traffic risk (discussed further in the next section). Current road traffic on the route is not sufficient to support the project and the TZR would rely on attracting regional traffic traversing other routes.

3. A major challenge in financing railway projects has to do with the attractiveness of fixed railway assets as a means of recourse to lenders. Fixed railway assets are 'bespoke' in nature and therefore have a limited resale value.

To compensate for these significant risks, it can be safely assumed that the private sector will want a significant premium on the cost of capital which would have to be further backed by guarantees. A realistic project-return benchmark between 15% and 17% can be assumed which is well below the IRR results presented in Table 3-9.

3.9 Sensitivities

The aim of a sensitivity analysis is to test the robustness of project returns by varying parameters such as the tariff and costs. These sensitivities are discussed below.

3.9.1 Traffic Sensitivity

Traffic risk is a major risk to a transport infrastructure project and the cases of actual traffic falling well below forecasts is well known. Table 3-13 summarizes the project returns if traffic is increased/decreased by 20%, relative to the base case.

Table 3-13: Project Returns based on Traffic Sensitivity

Scenario	- 20% decrease in traffic	Base case traffic	+ 20% increase in traffic
1	0.7%	5.9%	9.1%
2	4.5%	9.7%	13.5%
3	4.0%	9.1%	12.7%

As expected, increases/decreases in traffic are very sensitive to project returns. Furthermore, the regional forecasts[9] developed in the previous milestone of this assignment (and are used

[9] regional traffic is the traffic in Namibia's neighbouring countries that currently traverses other routes to major maritime ports such as the Port of Durban and Lobito Port.

in this financial assessment) are already close to the upper-bound of traffic that could potentially be rerouted from neighbouring corridors to the TZR. Therefore, it is not likely that actual traffic will be higher than what has already been forecasted.

3.9.2 Operating Expenditure Sensitivity

Variances in operating expenditures also impact project returns. Table 3-14 reviews changes in project returns if operational expenditures increase/decrease by 20%. Variances in operating expenditures are not sensitive to project returns.

Table 3-14: Project Returns based on Operating Expenditure Sensitivity

Scenario	- 20% decrease in operating expenditures	Base case operating expenditures	+ 20% increase in operating expenditures
1	6.8%	5.9%	5.0%
2	10.5%	9.7%	8.8%
3	9.9%	9.1%	8.2%

3.9.3 Capital Expenditure Sensitivity

Table 3-15 summarizes how project returns vary with a 20% change in capital costs (both infrastructure and rolling stock).

Table 3-15: Project Returns based on Capital Expenditure Sensitivity

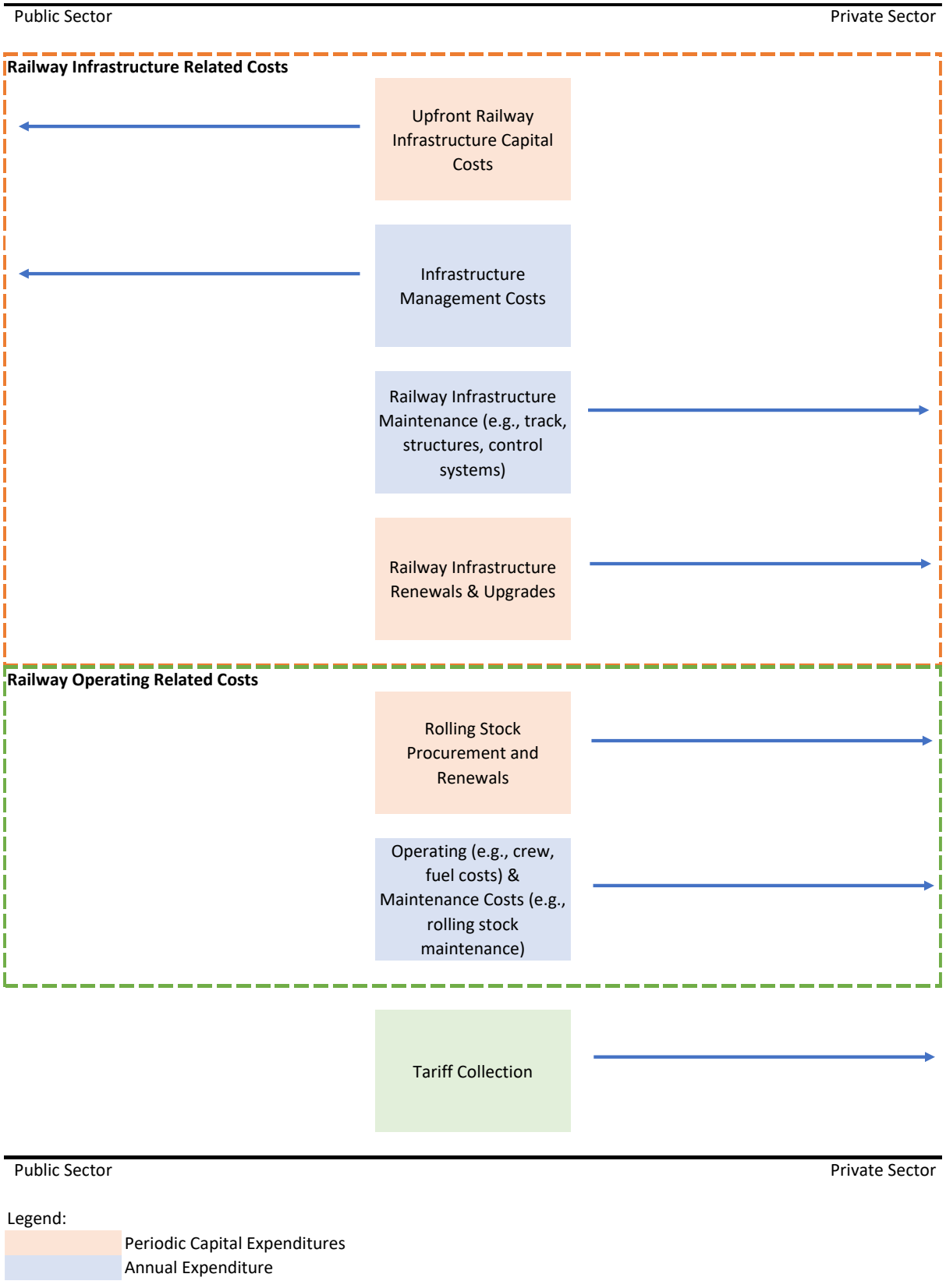
Scenario	- 20% decrease in capital expenditures	Base case capital expenditures	+ 20% increase in capital expenditures
1	7.4%	5.9%	4.7%
2	11.4%	9.7%	8.3%
3	10.8%	9.1%	7.8%

Changes in capital expenditures are fairly sensitive to project returns. As is typical with projects like the TZR, cost overruns can be expected. Add to this the high traffic risk and the result is that the private sector will require high project returns to both develop and operate the proposed TZR.

3.10 Project Structuring

As noted in the previous section, overall project returns – though positive – are not high enough to develop an attractive (Public-Private Partnership) PPP tender with a private party potentially developing, managing, operating and maintaining the line on its own without any public sector intervention. The results are not surprising as is typically the case with railway projects.

Figure 3-1: Project Structuring and Public and Private Sector Responsibilities



Various PPP project structuring options were tested in the financial model. This ranged from the public sector bearing all upfront and yearly expenditures and engaging an operator on a

management contract basis to a combination of public and private sector cost and service responsibilities.

The most ideal scenario to be found is summarized in Figure 3-1 whereby the state develops the proposed TZR and makes it available to a private operator (or private operators). The financial outlays that the state would be responsible are:

- Capital costs to develop the TZR's fixed infrastructure
- Yearly fixed infrastructure insurance costs
- Yearly infrastructure management costs (operations and commercial management of the private operator)

The private operator would be responsible for collecting tariff revenues which would cover its following responsibilities (costs):

- Rolling stock procurement and renewals including rolling stock purchases following operational commencement to meet forecasted increases in traffic
- Annual railway operating and maintenance costs such as crew and fuel costs as well as rolling stock maintenance costs
- Annual railway infrastructure maintenance costs including the cost to maintain track, structures, and control systems
- Major railway infrastructure maintenance and upgrades, as required, to meet increases in traffic

Tariff setting should be worked out between the state and the private operator, ensuring competition and a suitable balance of surface transport that is serviced by both rail and road (unlike the current situation which is heavily weighted towards road transport).

Tariff Setting and the Competition Commission

The 2018 Namibian Transport Policy recommends that the Competition Commission build up its rail expertise to regulate anti-competitive behaviour. We agree with this recommendation and view the Competition Commission as the nodal agency for collaborating with a private operator (or operators) to set a competitive rail tariff.

3.10.1 Concession Fee / Access Charge

The structure proposed in Figure 3-1 effectively keeps MoWT as the 'infrastructure owner' with the Ministry 'collecting rent' from a rail operator. This framework is also proposed in the 2018 Namibian Transport Policy.

'Rent' would be in the form of a yearly concession fee or access charge. As the state would be developing and providing the TZR infrastructure (US$2.267 billion in 2021 prices), a yearly concession fee/access charge for the right to operate on the line would be collected from the operator.

Assuming that a private operator will target a 17% project IRR under the proposed structure in Figure 3-1, Table 3-16 summarizes the annual concession fee/access charge the state can expect by scenario for a 25-year concession period.

Table 3-16: Yearly Concession Fee/Access Charge as a Percentage of Revenue

Scenario	Concession Fee/Access Charge as % of Yearly Revenue
One	26.0%
Two	35.5%
Three	36.2%

The concession fee as a percentage of revenue ranges between 26% and 36% based on the scenario. The section below further elaborates on the state's financial position under each scenario.

3.10.1.1 Financial Position of the State

Under the structure proposed above, the state will develop the proposed TZR and make it available to a private operator (or operators). In return, the state will collect a concession fee/royalty to cover the cost of developing the line as well as its own infrastructure management costs.

To illustrate the state's financial position over the forecast period, it is assumed that Namibia will enter into a sovereign loan agreement to develop the railway line. The terms of the loan agreement are summarized in Table 3-17 and are based on project appraisal reporting from AfDB's loan for the New Port of Walvis Bay Container Terminal Project.

The fixed lending rate (prior to the lending spread) was taken from AfDB's most recent publication of applicable lending rates for sovereign guaranteed loans from August 1, 2021, to January 31, 2022.

Table 3-17: Sovereign Loan Assumptions

Loan Parameter	Assumption	Comment
Tenor	20.00	Years
Payment Moratorium on interest and principal	5.00	Years
Interest Capitalized during Moratorium?	Yes	
Payback Period	15.00	Years
Lending Rate	1.02%	%
Lending Spread (Project Specific)	0.60%	%
All-in Rate	0.75%	%
Front-end Fee	0.25%	%
Commitment Fee	0.25%	%
Loan Amount	2,895	USD Millions
Loan Amount after Capitalized Interest	2,954	USD Millions

Table 3-19 which starts on Page 49 summarizes the State's cash flow position for each of the three scenarios. Note that it is assumed that the sovereign loan is exclusive of the VAT that is payable on capital expenditures. As such, VAT is included as a state expenditure and is equal

to 15% of the loan that is disbursed in each construction year. This arrangement is typical of infrastructure loans in Namibia that are provided by multi-lateral institutions.

Table 3-18 provides timing highlights of when the state's cash flows specific to this project become positive and the year in which positive cash flows cover the years of deficit spending (the construction period and either all or partial years of loan servicing based on the scenario).

Table 3-18: State Cash Flow Highlights by Scenario

Scenario	Year in which state cash flows become positive	Year in which cash flows fully cover years of deficit project spending
One	2043	2058
Two	2035	2043
Three	2037	2044

Expectantly, the state's cash performance on the proposed TZR project performs the best when the line is further connected to Zambia (scenario two and three). Under scenario two and three, the cash performance would likely further improve if there were an agreement with Zambia to share the cost of rolling stock.

Table 3-19: State's Financial Position for Scenario One

Scenario 1	Construction Period				Operating Period							
					Loan Servicing Period							
US$ Millions	31-Dec-23	31-Dec-24	31-Dec-25	31-Dec-26	31-Dec-31	31-Dec-36	31-Dec-42	31-Dec-47	31-Dec-52	31-Dec-57	31-Dec-62	31-Dec-67
Collections												
Concession Fee / Access Charge Collected	-	-	-	-	73	101	149	207	287	396	550	766
Disbursements												
Value-Added Tax on Capital Expenditure	90	89	103	117	-	-	-	-	-	-	-	-
Front-End Fee	7	-	-	-	-	-	-	-	-	-	-	-
Commitment Fee	5	4	2	-	-	-	-	-	-	-	-	-
Capitalized Interest	4	7	11	16	-	-	-	-	-	-	-	-
Interest Payable	-	-	-	-	36	22	3	-	-	-	-	-
Principal Payable	-	-	-	-	169	183	202	-	-	-	-	-
Insurance	-	-	-	-	38	44	52	68	79	91	106	146
Infrastructure Administration (Management, Commercial)	-	-	-	-	2	2	3	3	4	4	5	6
Net flow	(106)	(99)	(116)	(133)	(172)	(150)	(111)	136	204	300	439	614

Table 3-20: State's Financial Position for Scenario Two

Scenario 2	Construction Period				Operating Period							
					Loan Servicing Period							
US$ Millions	31-Dec-23	31-Dec-24	31-Dec-25	31-Dec-26	31-Dec-31	31-Dec-36	31-Dec-42	31-Dec-47	31-Dec-52	31-Dec-57	31-Dec-62	31-Dec-67
Collections	3											
Concession Fee / Access Charge Collected	-	-	-	-	197	275	412	576	803	1,118	1,563	2,193
Disbursements												
Value-Added Tax on Capital Expenditure	90	89	103	117	-	-	-	-	-	-	-	-
Front-End Fee	7	-	-	-	-	-	-	-	-	-	-	-
Commitment Fee	5	4	2	-	-	-	-	-	-	-	-	-
Capitalized Interest	4	7	11	16	-	-	-	-	-	-	-	-
Interest Payable	-	-	-	-	36	22	3	-	-	-	-	-
Principal Payable	-	-	-	-	169	183	202	-	-	-	-	-
Insurance	-	-	-	-	38	44	52	68	79	91	106	146
Infrastructure Administration (Management, Commercial)	-	-	-	-	2	2	3	3	4	4	5	6
Net flow	(106)	(99)	(116)	(133)	(48)	24	151	505	720	1,023	1,452	2,041

Table 3-21: State's Financial Position for Scenario Three

Scenario 3	Construction Period				Operating Period							
					Loan Servicing Period							
US$ Millions	31-Dec-23	31-Dec-24	31-Dec-25	31-Dec-26	31-Dec-31	31-Dec-36	31-Dec-42	31-Dec-47	31-Dec-52	31-Dec-57	31-Dec-62	31-Dec-67
Collections												
Concession Fee / Access Charge Collected	-	-	-	-	179	249	371	517	719	999	1,393	1,949
Disbursements												
Value-Added Tax on Capital Expenditure	90	89	103	117	-	-	-	-	-	-	-	-
Front-End Fee	7	-	-	-	-	-	-	-	-	-	-	-
Commitment Fee	5	4	2	-	-	-	-	-	-	-	-	-
Capitalized Interest	4	7	11	16	-	-	-	-	-	-	-	-
Interest Payable	-	-	-	-	36	22	3	-	-	-	-	-
Principal Payable	-	-	-	-	169	183	202	-	-	-	-	-
Insurance	-	-	-	-	38	44	52	68	79	91	106	146
Infrastructure Administration (Management, Commercial)	-	-	-	-	2	2	3	3	4	4	5	6
Net flow	(106)	(99)	(116)	(133)	(66)	(2)	111	446	637	903	1,282	1,797

3.10.1.2 Single v. Multiple Operators

Section 4.6.1 of the 2018 Namibian Transport Policy proposes that open network access be given to rail operators to operate Namibia's railways. Multiple operators are recommended as it maximizes competition.

The preceding analysis confirms that returns are high enough to attract private sector participation in operating the TZR. However, PPPs are new to Namibia and if applied, open network access would be a first for the country.

As such, we recommend that railway operations be tendered as a 'single operator' PPP. This is particularly true if the TZR is developed without further regional rail connectivity (Scenario One above). Once traffic develops and there is a track-record for successful private rail operations, rail access can be opened to more operators to spur competition.

However, if the TZR is built in partnership with Zambia and there is railway connectivity between the two countries, then giving access to multiple operators can be further explored. The case for multiple private operators under scenario two or three is that more traffic can be expected under these scenarios. Under a regime of multiple operators, it should be noted that the responsibility for maintaining rail infrastructure – including the commercial arrangements for such a responsibility – should be given to only one of the multiple operators.

If regional railway connectivity beyond Katima Mulilo is developed and operational but only some years after the TZR is commissioned, then a subsequent open access tender could be issued to address the additional traffic. In this case, it is recommended that the first operator also be granted the opportunity to bid on such follow up open access tenders.

3.10.1.3 Transport Investment Fund

Financial modeling shows that under an open access PPP structure, the returns are sufficient for a private operator to be made responsible for major maintenance renewals and upgrades. Practically however, operators may shy away from this responsibility or may delay major renewals and upgrades due to profit incentives.

Under a structure whereby MoWT remains responsible for major maintenance and upgrades, a 'Transport Investment Fund' can be developed and legislated to fund such works. Note that under such a structure, concession fees/access charges to the state would be higher (relative to what was derived in Table 3-16) as the private operator would not be responsible for major maintenance and upgrade expenditures. As such, a portion of the concession fee/access charge could be used to capitalize the 'Transport Investment Fund' with the fund being used to maintain/upgrade the line.

3.10.1.4 Alternative Structures

MoWT may still consider raising private/commercial financing and equity on a 'project finance' basis where repayment is tied to the TZR's earnings. Under such a structure, higher lending rates can be expected than that of a multi-lateral loan which would decrease the 'bankability' of the project.

To bridge the bankability gap, lump sum or periodic gap funding may be required if annual TZR earnings are lower than loan servicing requirements. In essence, government would be providing a guarantee on traffic risk.

Alternatively, the government may consider becoming an 'equity partner' and provide an upfront investment in a special purpose vehicle with other private shareholders to develop and operate the TZR. Though such structures have been implemented to develop port projects in Africa, the same is to be tested in railway structures. Such a structure would also have to resolve conflict of interest vis-à-vis the state as an investor-operator and a regulator in railways, and with respect to prioritizing competition over profit.

Though such structures can be investigated, a sovereign loan which is to be serviced by the state with concession fees/access charges should be prioritized.

3.10.2 Risk Assessment

The TZR will face risks at various stages of development and operations. Table 3-22 on the following pages covers those risks and how best to mitigate them. Mitigating risks is based on the principal of transferring risks to the party that is beset placed to manage the risk in question.

Table 3-22: Risk Register

Risk	Description	Primary Responsibility	Secondary Responsibility (Where Applicable)	Mitigation
Pre-Construction Phase				
Public Opposition and Land Acquisition Issues	The public (e.g., truck owners) may oppose the project and the state may face issues with acquiring the necessary land for the proposed route	MoWT		1. During the full Environmental/Social Impact Assessment phase, ensure that affected parties are consulted frequently and that their concerns are addressed 2. At the detailed design stage, conclude a route/alignment that – to the extent possible – avoids necessitating resettlement 3. Where land acquisition and resettlement are required, ensure that landowners/users are fairly compensated 4. Make the Truckers Association a key stakeholder early on in project to understand its members' concerns and how to resolve them
Failing to attract financing and/or suitable operator(s)	The proposed TZR fails to attract construction financing and/or suitable private operators to operate and maintain the line	MoWT		1. Carefully structure the project so that financiers are confident that their loans will be successfully serviced 2. Prepare a commercially attractive tender by conducting market outreach pre-bid conferences activities to develop a project structure that sufficiently address the concerns of the private sector
Construction Phase				

Risk	Description	Primary Responsibility	Secondary Responsibility (Where Applicable)	Mitigation
Planning and delays	Constructing the line is not planned correctly or is completed later than expected	MoWT / Contractor	Planning Consultant	1. MoWT should prepare Detailed Designs of Front End Engineering stage to improve authenticity and accuracy of construction activities and costing for the tendering stage (merits further discussed in Section **Error! Reference source not found.**) 2. Construction contract should have provisions for a maximum cost ceiling. Any extra costs above the ceiling would be borne by the contractor 3. Provisions for the contractor to pay for damages if the project fails to meet the minimum performance standards as tested by an independent engineer 4. Include provisions for the contractor to be liable for payment in case of construction delays
Low performance: time frame and quality	Contractor is not performing to the agreed specifications	Contractor		
Cost overruns	There are construction cost overruns	Contractor	Design Oversight Consultant	
Other performance failure	There are other reasons for the construction phase to underperform which are outside the control of the contractor	MoWT		
Operating Phase				
Traffic	Traffic does not materialize as forecasted Roads capture more of the predict traffic Walvis Bay Port cannot cope with the volumes Resistance to use interchange facility at Katima Mulilo	Uncontrollable risk to any party		1. During the project development phase, entities such as the WBCG to market the line to potential users (e.g., copper mines) to firm up commitments to use the line. This will increase the attractiveness of the line to potential operators 2. The State can provide a traffic guarantee during the early stages of operations 3. Conduct a road and rail pricing study in Namibia to determine optimal tariff setting that incentivizes the shift from road to rail

Risk	Description	Primary Responsibility	Secondary Responsibility (Where Applicable)	Mitigation
				4. Identify the Roads Authority as a key stakeholder in decision-making to ensure the Authority's buy- in and backing of the TZR (which would be a competing mode of freight transport) 5. Engage only one operator in the short-term with the aim of opening rail access to multiple operators once traffic matures 6. Considering the regional freight potential for the TZR, work with neighbouring countries such as Zambia to further extend the line into freight generating areas such as the Copperbelt 7. Ensure that NamPort's current expansion plans can accommodate increases in traffic and as required, make updates 8. Consider setting up a 'logistics chain' fund to address future expansion of the TZR and Walvis Bay Port. Portion of port and rail revenues can be used for funding 9. Develop commercially friendly interchange infrastructure and services at Katima Mulilo to ensure quick transfer from road to rail 10. Consider regional legislation that enforces the use of rail over road
Operating performance failure	Malfunctioning, poor procedures, or insufficient maintenance	Operator		MoWT to enter into an Operating & Maintenance Service Level Agreement with an operator (or operators)

Risk	Description	Primary Responsibility	Secondary Responsibility (Where Applicable)	Mitigation
Movement fluidity with existing network	Trains do not move seamlessly between the TZR and Namibia's existing network	MoWT		1. Ensure that the existing line between Grootfontein and Walvis Bay are upgraded to the same standard as the proposed TZR 2. Favour access rights to an operator from Katima Mulilo through to Walvis Bay instead of operational responsibilities switching at Grootfontein between the operator and TransNamib
Risks across all phases of the project				
Legal and Regulatory	The potential that laws or regulations may change unfavourably for the operator	Insurance Provider		The contractor can purchase political risk, natural disaster, and business interruption insurance
Natural Disaster or a Pandemic	A natural disaster/pandemic may negatively impact construction or operations such as a severe earthquake COVID-19.	Insurance Provide		
Counterparty	One of the counterparties is unable to perform in accordance with the terms of the relevant agreement	MoWT		1. Ensure that counterparties are financially stable and sound 2. Include provisions for counterparties to be replaced in case a counterparty fails to perform
Inflation/Interest Rates	Materialized inflation and/or interest rates differ from expectations	MoWT		Include provisions for inflation in contracts and consider interest rate hedging
Regional Risks	Lack of support from neighbouring countries to connect to the proposed TZR (e.g., Zambia may favour	MoWT		1. Traffic study has shown that there is scope for the TZR to capture traffic even with a well-functioning Benguela line

Risk	Description	Primary Responsibility	Secondary Responsibility (Where Applicable)	Mitigation
	connecting to the Benguela Line)			2. Get Zambia's commitment early on to connect its network to Namibia

4 Economic Assessment

4.1 Introduction

While the financial assessment performed in the previous chapter compared financial revenues earned and financial costs incurred by the operator of the new railway line, the economic appraisal is required to assess economic costs and benefits accruing to the Namibian community as a whole.

This means firstly that benefits will no longer measure revenues received by the railway operator but will rather reflect net cost savings resulting from modal switches of traffic flows from existing modes (mainly road) to the new railway (or multi-modal) route. In addition, both costs and benefits are adjusted to reflect economic rather than financial values, excluding the effects of indirect taxes, import duties and subsidies which do not reflect real resource values.

This section describes the economic assessment of the proposed Trans-Zambezi Railway Line based on the traffic estimates covered in Section 2 of this report.

4.2 Approach

The economic assessment was conducted by converting financial benefits and costs into economic benefits and costs directly in the financial model that was developed for the previous section. In addition, revenues were modified so as to no longer reflect the tariff revenues collected from rail operations, but rather the transport cost savings and other benefits achieved by switching of the forecast traffic flows from the parallel road route through Namibia, or from other routes through neighbouring countries, to the TZR.

Specifically, Excel sheets were developed according to the above criteria and inserted into the financial model to produce an economic assessment, reflecting benefits and costs to the community as a whole.

Although this is potentially an important regional project, no attempt has been made to evaluate additional costs and benefits which will be associated with parallel investments in Zambia or Botswana.

National Level Analysis

It is important to note that the quantified costs and benefits refer strictly to those incurred or enjoyed along the new 772-km line between Grootfontein and Katima Mulilo. Under the different scenarios reviewed, various assumptions have been made about parallel investments in neighbouring countries.

Although this is potentially an important regional project, no attempt has been made to evaluate additional costs and benefits which will be associated with parallel investments in Zambia or Botswana.

The proposed line is expected to shift traffic from road to rail thereby reducing Greenhouse Gas Emissions (GHGs). GHGs are not localised gases and so, the impact is felt globally. This

section concludes with a discussion on the net impact of GHGs in the region if the TZR is developed.

4.3 Economic Benefits

Quantified economic benefits consist mainly of (i) road transport cost savings and (ii) reduced road maintenance costs which are divided into the two following streams:

1. Current road traffic travelling along the Trans-Zambezi Corridor that would shift to the TZR (namely, Namibia's existing import, export and transit traffic along the corridor). Using conventional terminology for highway studies, this traffic is considered as '**Normal**' traffic enjoying a reduction in transport cost as it makes a modal transfer from road to rail.

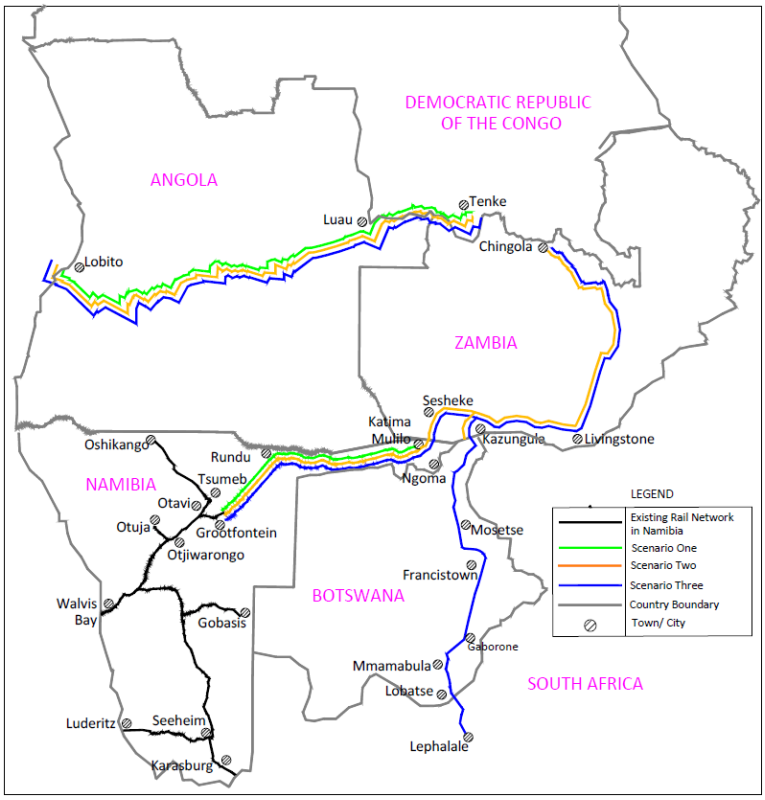
This Normal Traffic is calculated by subtracting TZR road traffic flows under railway Scenarios One, Two and Three from the road flows under the Base Case scenario without the railway'.

2. Other regional traffic that currently travels on routes outside of the Trans-Zambezi Corridor but would shift to the TZR. The terminology for this traffic is referred to as '**Diverted**' traffic.

For the purposes of this study, diverted Traffic (from other routes) will account for all further traffic on the railway other than the Normal Traffic already defined above. This may be computed by subtracting these Normal Traffic flows from the total rail flows forecast under Scenarios One, Two and Three.

Road transport cost savings and reduced road maintenance costs (economic benefit) were calculated by subtracting the estimated road traffic in Scenario One, Two and Three (see Figure 4-1) from the Base Case scenario where the TZR is not built and all existing import, export and transit traffic remain on the road along the Trans-Zambezi Corridor.

Figure 4-1: Railway Development Scenarios



Diverted traffic also enjoys a transport cost reduction benefit since it has transferred from another route, but, since it previously chose to move by this other route rather than by the road on the Trans-Zambezi corridor, it can be assumed to earn a unit benefit per tonne lower than that computed for normal traffic making a simple modal transfer.

In other words, the unit benefit achieved by the regional transfer traffic must lie between zero and the unit benefit achieved by modal transfer traffic. The normal practice adopted for diverted traffic in such studies is to attribute an average unit benefit per ton of 50% of that for normal traffic.

4.3.1 Economic Road Vehicle Operating Cost Savings

Economic road vehicle operating costs are customarily used in the evaluation of highway projects, normally using the World Bank's HDM-4 model. These economic costs are expressed in terms of vehicle-kms and include several cost components, including vehicle depreciation, interest charges, tyre costs, fuel, lubricants, maintenance labour and spare parts, crew costs and overheads.

On the basis of data made available from recent road studies in Namibia, it has been estimated that, on a highway that is in good to fair condition on mainly level terrain, the economic vehicle operating cost for a seven-axle articulated vehicle was approximately US$1.50 per km in 2016, which may be equated after allowance for recent dollar inflation to US$1.70 per km at 2021 prices.

If it is assumed that the typical vehicle plying the Trans-Zambezi route would be a seven-axle vehicle with an average 28-ton payload, then the average cost per ton-km of payload may be estimated as US$1.70 per vehicle km or US$0.06 per ton-km.

4.3.2 Reduced Road Maintenance Costs

In addition to the economic vehicle operating costs borne directly by the vehicles, trucks travelling along the highway will also cause additional road maintenance costs to be incurred by the highway authority.

In order to assess these for the case of the Trans-Zambezi Highway, an exercise was performed, using the HDM-4 model, to assess the potential savings in road maintenance costs which can be achieved by transferring flows of heavy goods vehicles presently using the highway to the proposed Trans-Zambezi Railway.

Using a long-term 50-year timeframe for the years 2017-66, recurrent and capital maintenance schedules were established for the 'with' and 'without' the TZR cases are summarized in Table 4-1.

Table 4-1: Average Base Traffic Flow (in terms of Annual Daily Traffic)

Vehicle Type	Annual Daily Traffic Assumption (Rounded)
Light Vehicles (Cars, 4x4, minibuses, light goods vehicle)	579.5
Medium and heavy buses	56.8
Heavy trucks	43.1
Articulated trucks	65.6
Total	745

Traffic growth rates were taken to be 1.20% per annum for light vehicles and 5.11%[10] per annum for buses, trucks and articulated vehicles, with heavy traffic only being reduced by 70% between 2025 and 2026, as the railway opened under the 'with TZR case.

The HDM-4 model was used to estimate required road maintenance costs over the period 2011-66 under the two scenarios. Recurrent and capital maintenance needs are summarised in terms of average recurrent and capital costs per annum as in Table 4-2.

[10] With the predicted traffic growth, capacity upgrades might be required as traffic increases. Such upgrades could be considered during the road rehabilitation stage depending on actual traffic volumes. Examples of upgrades include adding the 3rd lane in the 2+1 solution where passing lanes are provided at fixed locations. This would resolve capacity as well as safety concerns.

Table 4-2: Average Annual Maintenance Costs per Km (N$)

Cost	Average Annual Maintenance Costs per Km		Saving with TZR
	Without TZR	With TZR	
Recurrent costs	42,264	38,476	3,788
Capital costs	139,385	111,332	28,053
Total Costs	**181,649**	**149,807**	**31,842**

Note: Numbers may not add up due to rounding

Over the forecast period, the total savings per km of road is N$1,592,100 or US$100,766 (assuming a 15.8 N$/US$ exchange rate which was pertinent to the time of the analysis).

The financial and economic analysis of the proposed railway assumed that rail traffic would be transferred from articulated trucks which predominate in the international road traffic along the corridor. It is considered a reasonable assumption that 60 % of the total savings in road maintenance costs may be attributed to articulated trucks, or an average of US$ 60,459 per annum.

The road maintenance cost savings under the 'with TZR' case attributable to articulated trucks have been estimated at US$60,459 per km. With an expected reduction in flow of 3,523,307[11] articulated trucks over the years 2026-66, the average cost reduction per truck-km may be calculated as US$ 60,459 / 3,523,307 or US$0.01716 per truck-km. Assuming an average truck payload of 28 tonnes, this equates to US$0.00061 per payload tonne-km.

4.4 Economic Costs

4.4.1 Indirect Taxes in Namibia

In carrying out an economic assessment it is necessary to use economic prices of goods and services to express true resource values. The principal adjustment required is the removal of indirect taxes, duties, and subsidies, which distort these resource values.

Value added tax (VAT) is the main indirect tax levied in Namibia. This tax has a standard rate of 15%, although some items attract a zero rate. As a rule, VAT is paid on entry for items imported from abroad and is typically levied on the FOB (free on board) value of the product, increased by 10 % to reflect import costs.

Customs and excise duties may be levied on imported products; however, since Namibia is a member of the Southern African Customs Union (SACU), including Botswana, Eswatini, Lesotho, Namibia and South Africa, no duties are levied on imports from those countries. There is also a free trade agreement with Zimbabwe, while preferential tariff rates are applied to imports from all SADC countries up to Tanzania and the Democratic Republic of Congo.

Excise duties are levied on specific commodities including cigarettes, beer, spirits and fuels. A specific levy is raised on fuel to support the Road Fund Agency in its road maintenance effort. A more detailed breakdown of the fuel price structure, identifying economic costs against the prices paid at the pumps, is given in Section 4.4.2 below.

[11] 0.714585 x 365 x 65.63 x 1.05119 x (1.051141 – 1) / (1.0511 – 1) = 3,523,307

Ad valorem duties are raised on certain luxury products, such as motor cars and perfumes

Environmental levies are also raised on fuel emissions from vehicles including trucks, and also on products including light bulbs, lubricants, tyres and batteries.

4.4.2 Fuel Duties and Prices

The Ministry of Mines and Energy (MME) determines the selling prices of petrol and diesel at the pumps, using a standard format to add distribution costs and various taxes to the cost of imported refined fuels. A simplified version of the price structure for November 2021 is shown in Table 4-3, with Namibian dollar prices in the first two columns being followed by dollar equivalents at the rate of US$ 1 = N$15.53 prevailing on November 2, 2021.

Table 4-3: Fuel Price Structure for Namibia, November 2021

		Values in N$ Cents			Values in US$ Cents	
		Petrol	Diesel		Petrol	Diesel
Import prices, Walvis Bay		960.963	950.577		61.88	61.21
Coastal stock financing cost		2.567	2.539		0.17	0.16
Coastal storage		2.214	2.214		0.14	0.14
Industry margin		108.000	108.000		6.95	6.95
Dealer's margin		113.000	113.000		7.28	7.28
Total before Tax		**1,186.744**	**1,176.330**		**76.42**	**75.74**
Customs and Excise Duty		4.000	4.000		0.26	0.26
National Energy Fund Fuel Levy		98.000	102.000		6.31	6.57
Road User Charge		148.000	148.000		9.53	9.53
Fuel Tax		90.000	90.000		5.79	5.79
MVA Levy (for accident insurance)		50.300	50.300		3.24	3.24
Service differential		17.350	17.350		1.12	1.12
Total Taxes		**407.650**	**411.650**		**26.25**	**26.51**
Total including Taxes		**1,594.394**	**1,587.980**		**102.67**	**102.25**
Price stabilisation adjustment (NEF)		**(149.394)**	**(169.980)**		**(9.62)**	**(10.94)**
Pump Prices		**1,445.000**	**1,418.000**		**93.05**	**91.31**

Hence the pump price in November 2021 was fixed at N$ 14.18 per litre, equivalent to US$ US$0.91 per litre, while the economic cost excluding taxes and subsidies was N$11.76 per litre, equivalent to US$0.76 per litre.

Detailed price breakdowns are prepared by MME each month, reflecting the latest changes in fuel prices, exchange rates and Namibian tax rates. In December, after months of rising prices, the average prices of refined petrol and diesel fell from US$91 to US$84 per barrel (or from US$0.57 to US$0.53 at 159 litres per barrel), the US dollar exchange rate moved from N$15.53 up to N$15.92, and the National Energy Fund price stabilisation adjustment was substantially reduced.

This resulted in a December revision of the Walvis Bay pump prices from N$14.55 per litre for petrol and N$14.18 per litre for diesel to N$15.65 and N$15.58 respectively. Using the above

information, at a December exchange rate of US$ 1 = N$ 15.92, gives a financial cost for diesel of US$ 15.58 / 15.92 = US$ 0.98 per litre, and an economic cost estimated at US$ 11.46 / 15.92 = US$ 0.72 per litre. The MME has now announced that its pump prices will remain unaltered for the month of January 2022.

Because the MME price stabilisation adjustments were much lower in December, and rising oil prices also appeared to have stabilised, it appears reasonable to US$ 0.72 per litre as the economic value for the price of diesel.

4.5 Conversion Factors for Railway Costs

The financial analysis has already developed detailed cost estimates for railway construction, operation and maintenance. Indirect taxes must be removed from these costs to give economic costs of rail investment and rail transport. The main adjustments relate to removal of value added tax and to re-pricing of fuel. The detailed assumptions made are outlined in Table 4-4.

Table 4-4: Economic Conversion Factors

Financial Item	Adjustment
Infrastructure Costs	
- Permanent way and formation	No adjustment required as estimate is provided before tax
- Structures	No adjustment required as estimate is provided before tax
- Workshops, Tools & Plants, and Electrical	No adjustment required as estimate is provided before tax
- Prelims, Contingencies, Project Management	No adjustment required as estimate is provided before tax
- Land Acquisition and Resettlement	No adjustment required
Rolling Stock Costs	
- Locomotives and Wagons	Adjusted to pre-VAT amount
Infrastructure Management, Operating and Maintenance Costs	
- Maintenance of locomotives and wagons	Spare parts assumed to have VAT included requiring adjustment. No adjustment to labour costs. Adjustment factor = 0.9
- Rail operating costs	Materials and supplies assumed to have VAT included requiring adjustment. No adjustment to labour costs. Adjustment factor = 0.9
- Fuel costs	Rate of USD 0.72 per litre to be used in place of financial cost of USD 0.98 per litre. Reimbursable amount of the fuel levy added back to the economic fuel cost.
- Management and administrative costs	Materials and supplies (e.g. computers and stationery assumed to have VAT included requiring adjustment. No adjustment to labour costs. Adjustment factor = 0.9

4.6 Results & Conclusion

Table 4-5 summarizes the economic internal rate of return by scenario based on the preceding discussion on economic benefits and costs particular to the TZR.

Table 4-5: Economic Internal Rate of Return by Scenario

Scenario	Economic Internal Rate of Return
One	4.7%
Two	14.6%
Three	13.7%

As can be expected, the scenarios where the TZR forms part of a wider regional railway system (i.e., connected to Zambia and/or Botswana), produce the highest economic returns. This further confirms that the TZR stands to benefit the most when it is further connected to Zambia's existing network (Scenario Two) and to a slightly lesser degree, with Botswana also connecting its current railway system with Zambia (Scenario Three). The TZR without railway development cooperation from Zambia and Botswana leaves many benefits 'on the table'.

It is also important to note that there are further economic benefits that were not quantified but would further add to the economic returns. Such benefits include:

- Reduced empty backhaul of trucks
- Potential net savings in accidents (rail vs. trucks)

The community will also benefit from higher direct employment both during the construction phase and operational phase. However, with traffic shifting from road to rail, truck employment is expected to be negatively impacted. However, it can be expected that society **as a whole**, will benefit from having the Trans-Zambezi Rail developed.

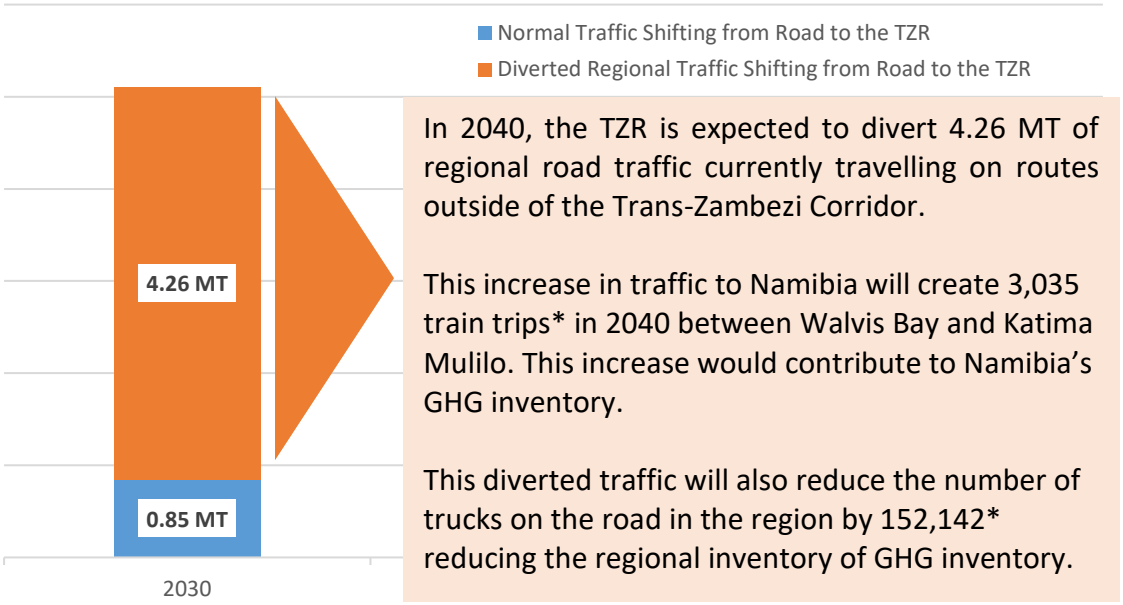
4.7 Greenhouse Gases

The preceding analysis is based on the costs and benefits strictly within Namibia's borders. However, the TZR is expected to divert regional traffic that currently travels on routes outside of the Trans-Zambezi Corridor but is expected to shift to the proposed line.

Greenhouse gases are not localised gases and so, the impacts are felt regionally and beyond. Figure 4-2 illustrates this in the context of the TZR.

While the regional traffic that is diverted to the Trans-Zambezi Corridor will increase Namibia's GHG inventory, the reduced truck traffic will decrease the region's GHG inventory.

Figure 4-2: TZR's Net Impact on GHGs (Scenario One, 2040 as an Example)



* Assumes that the average payloads of one train consist and one truck are 1,404 tonnes and 28 tonnes, respectively

The following section quantifies the national and regional impact of GHGs once the TZR is developed and operating.

4.7.1 Main Assumptions

Table 4-6 summarizes the main assumptions that were used to national and regional GHG emissions.

Table 4-6: GHG Assumptions

Item	Assumption
Locomotive Diesel Consumption (per loco)	4.50 Litres/KM
Truck Diesel Consumption	0.50 Litres/KM
Diesel Carbon Dioxide (CO_2) Emissions	0.00269 Tonnes/Litre of Diesel[1]
Diesel LocomotiveMethane (CH_4) Emission Factor	0.2516 Grams/Litre[1]
Diesel Locomotive Nitrous Oxide (N_2O)	0.0628 Grams/Litre[1]
Diesel Heavy Vehicle Methane (CH_4) Emission Factor	0.0038 Grams/KM[1]
Diesel Heavy Vehicle Nitrous Oxide (N_2O)	0.0027 Grams/KM[2]
Methane to Carbon Dioxide Equivalent (CO_2E) Conversion Factor	29.802[3]
Nitrous Oxide to Carbon Dioxide Equivalent (CO_2E) Conversion Factor	273.00[3]
Social Cost CO_2 Emissions	US$58.58/tonne[4]
Social Discount Rate	12%

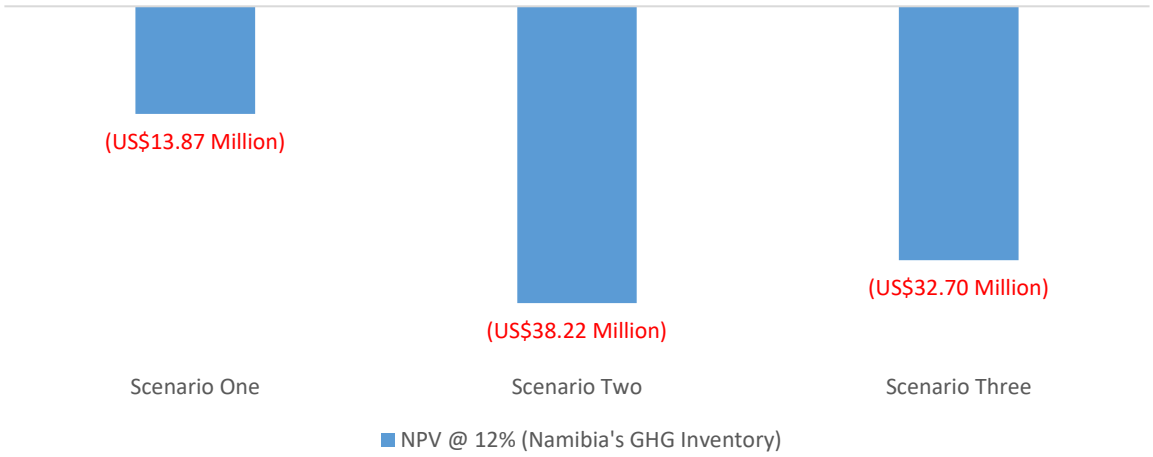
1. Source: US EPA – Emission Factors for Greenhouse Gas Inventories (2014)
2. Source: IPCC Sixth Assessment Report Global Warming Potentials (2021)
3. Source: Estimated under the US Presidency of Barack Obama in 2016 and inflated to 2022 prices

4.7.2 Namibia's GHG Inventory

Referring to Figure 4-2 on Page 67, Namibia can expect an increase in its GHG inventory as it will run trains to haul diverted traffic in the region once the TZR is operating.

Discounted at a social rate of 12%, Figure 4-3 summarizes the net present value of Namibia's GHG inventory in US dollar terms. As expected, the trains required to haul regional traffic diverted to the TZR represent an incremental social cost to Namibians.

Figure 4-3: Namibia's GHG Inventory by Scenario



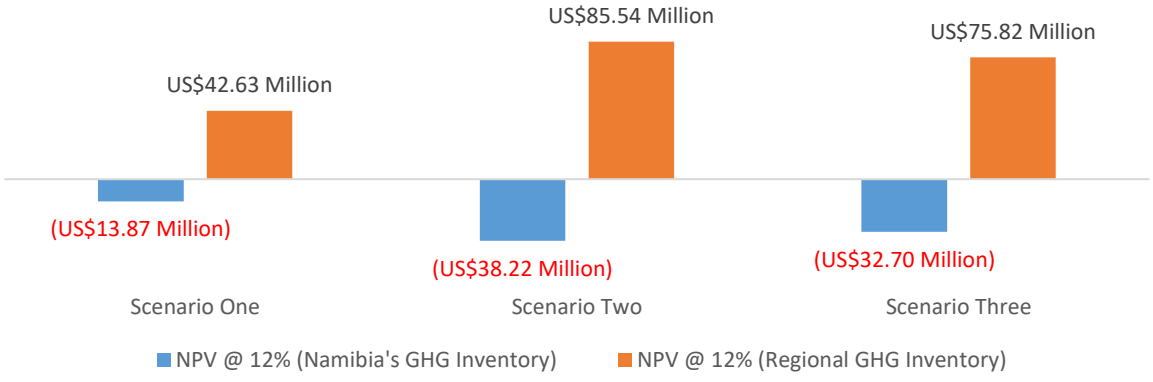
4.7.3 Regional GHG Inventory

The analysis in the preceding section is at a national level (looking at Namibia's change in GHG inventory only). Substantial regional social benefits can be expected by the reduction of truck traffic as regional traffic is diverted to the proposed railway line.

To estimate the regional social benefit, the results of the preceding analysis indicated that the CO_2E social costs per truck and train Tonne-KM were US$0.00282 and US$0.001019, respectively. This implies a 2.8x truck-to-train GHG social cost factor.

Using this social cost factor, Figure 4-4 summarizes the net present value of the region's GHG inventory in US dollar terms, discounted at a social rate of 12%. For interest, the net present value of Namibia's GHG inventory from Figure 4-3 is also shown.

Figure 4-4: Regional GHG Inventory by Scenario



Each trainload between Katima Mulilo to Walvis Bay carrying regional traffic reduces regional truck traffic by 51 trucks. While the TZR will increase Namibia's GHG inventory, the region stands to benefit from a reduction in GHGs by having significantly fewer trucks on the road.

5 Environmental and Social Scoping Assessment

5.1 Introduction

This chapter identifies and assesses environmental and socio-economically sensitive areas and concerns applicable to the TZR route along with the required next steps to ensure adequate mitigation and safeguards are in place as the project progresses through the development cycle.

Through the course of this study, environmental and social sensitivities were identified the for various route options identified in the Travel Demand Report (Vol I). The aim of this section is to focus the environmental and social discussion to the preferred route option.

This environmental and social assessment has been performed at a preliminary level and sets out to achieve the following:

a) Identification of sensitive environmental and social conditions
b) Identification of potential environmental and social impacts with possible mitigation measures
c) Terms of Reference for a full ESIA and ESMP with applicable actions plans and studies to be carried out for the environmental authorisation.

Note that the Environmental Management Act 7 of 2007 is reviewed in Section 6 of this volume.

The methodology of this work included a desktop study of available publications for the study area, and the Preliminary Environmental Impact Assessment for the Katima – Cape Fria Railway Line and available aerial photography.

Interactions were held with other key experts in the Consultant team to share information about project impacts. Recommendations made in this chapter include the next steps required to complete the Environmental and Social Impact Assessment (ESIA) and Environmental and Social Management Plan (ESMP).

5.2 Key Environmental and Social sensitivities

Based on the current preferred route, the railway alignment will follow, the following key sensitivities are presented, which may be affected by the railway construction and operation.

Table 5-1 presents the salient ecological and socio-economic baseline conditions of the study area that are likely to be sensitive to the project determined based on experience and aerial photography.

Table 5-1: Summary of ecological and socio-economic baseline conditions in the study area

Environmental Parameter	Grootfontein-Rundu	Rundu-Divundu	Divundu-Katima Mulilo
Climate	• Average annual rainfall increases steadily from Grootfontein north-westwards, from 500-550mm at Grootfontein to 550-600mm at Rundu. Part of the wettest zones in Namibia. • Average annual temperatures are 20-22 ˚C	• Average annual rainfall is 550mm, mostly as summer thunderstorms. • Average annual temperatures are 20-22 ˚C.	• Average annual rainfall is 550mm, increasing gradually towards Katima Mulilo, where it is more than 600mm. Flooding is prevalent towards Katima Mulilo in the rainy season. • Average annual temperatures are 20-22 ˚C.
Topography/Geology	• Flat terrain, with some small inselbergs in the vicinity of Grootfontein that are part of the limestone-dolomite rich karstveld (a landscape in the area formed by the dissolution of soluble rocks, particularly the limestone, which has formed underground sinkholes and caves and with surface features such as limestone ridges). • Bedrock of the Kavango basin largely covered by a thick mantle of Kalahari sand – run-off is limited • Calcrete in many places along the route – a white rock formed when sand has been consolidated with calcium carbonate, this material is widely used for constructing roads	• The area is mostly flat. Omiramba (local name for flat, shallow, slow flowing ephemeral rivers of the Kavango Region) that flow into the Okavango River carved shallow valleys orientated northwards, north-eastwards and eastwards. • The main hydrological feature is the Okavango River and is crossed at Divundu.	• Exceptionally flat, with only gentle undulations in the uniformly sandy substrate of the Kalahari basin. • Three Rivers: the Zambezi, Kwando and Okavango Rivers will be crossed in this section. They generally have extensive flood plains.
Vegetation and habitat	• The section around Grootfontein is Karstveld, with mixed woodlands (many of the Kalahari species toward Rundu but mixed with areas dominated completely by mopane shrubs and trees	• Kalahari woodlands are widespread. Riverine forest mostly destroyed due to settlement and associated activities along the entire Namibian section of the Okavango River. The few small remnants	• The general vegetation cover is of the North-eastern Kalahari woodland. The sandy dunes host tall teak, false mopane, burkea, kiaat, and mangetti trees, while shrubby silver terminalia, camelthorn, *Combretum hereroense* and *Acacia fleckii* grow on the lower clayey valley areas

Environmental Parameter	Grootfontein-Rundu	Rundu-Divundu	Divundu-Katima Mulilo
	and occasional boabab trees, some proclaimed as National Monuments). • Northward towards Rundu is classified as north-eastern Kalahari woodland, which are broadleaved woodlands.	close to the river are of high conservation concern.	between the dunes. The area generally has a dense vegetation cover but is under threat due to unsustainable harvesting. • Patches of riverine forest along the rivers, but they are rare, due to farming pressures along the edges. The patches remaining are of high conservation concern. • Floodplains along the riverbanks are areas of seasonally inundated marsh and grassland and are very fertile. These plains are under increasing threat of utilisation. They also carry high conservation status.
Fauna	• Large animals mostly confined to the Mangetti National Park and the commercial farms • Birdlife reasonably diverse.	• Wildlife along this area is mostly confined to the conservation areas towards Divundu. Game such as kudu, gemsbok, blue wildebeest and steenbok occur in the Kalahari woodlands but are thinly scattered. Small mammals, reptiles and amphibians found in the woodlands are typical of the habitat and have wide areas of distribution, therefore carry no conservation status. Birdlife is also typical of this habitat.	• The entire area is closely linked with areas of Zambia, Zimbabwe and Botswana by virtue of the wildlife, especially elephant and buffalo that use it as corridors. Numbers of large mammals are on the decline possibly due to the shrinking size of their habitats. Many of the mammal species in this area carry high conservation status. Elephant, roan, sable, tsesebe, hippo, lechwe, and reedbuck, to name some, are classified as Vulnerable in Namibia. Waterbucks are endangered. Water-associated animals such as otters, water leguaan and Nile crocodile are extremely rare in Namibia and are classified as vulnerable or Endangered (Mendelsohn and

Environmental Parameter	Grootfontein-Rundu	Rundu-Divundu	Divundu-Katima Mulilo
			Roberts, 1997). The highest bird diversity in the country is found in this area. • A large proportion of this area is dedicated to conservation, and the railway line will traverse many of these areas, including conservancies, State Forests, and the Bwabwata National Park.
Socio-economic environment (Also see Sections 5.7 and 5.8 of Vol I, Land Use Parameters and Acquisition/Resettlement Costs)	• Grootfontein-Mururani commercial farms • Communal farms from Mururani to Rundu - Main livelihood sources are crop cultivation and livestock rearing, on which the communities are very dependant. Substance abuse, crime and violence are on the increase in these areas. • Higher density development at Grootfontein and Rundu. • Graveyards exist throughout the area and are associated with the denser settled areas.	• The higher densities along this section along the route are north of the road and have been avoided. • Communal rural livelihood strategies are similar to those for the area south of Rundu. • The natural resources in this area are the main source of livelihood and people on highly dependent on them. • They are also vulnerable to disease such as malaria and HIV/AIDS. • Some graves are located behind the homestead where the person lived, while in other cases villages have one big cemetery serving the whole village. There is no discernible pattern with regard to their localities.	• Most of the Zambezi Region is communal farms growing mahango, maize and vegetables. There is also irrigated agriculture close to Katima Mulilo and Divundu, using water from the perennial rivers. Higher density development close to the roads, near Kongola and as one approaches Katima Mulilo. • The section is also almost completely covered by the Bwabwata National Park, with multiple use zones within the area. • High level of dependence on natural resources of soil, grazing, water and veld foods cause residents to be vulnerable to droughts, pests, livestock disease, floods, and wild animals. They are also vulnerable to disease such as malaria and HIV/AIDS. • Substance abuse, crime and violence are on the increase in these areas. • Graveyards are scattered throughout the area and from experience their relocation/compensation is non-negotiable among the Caprivians.

5.3 Potential Impacts

The identification of impacts as discussed below gleaned on experience of the Katima to Cape Fria proposed Railway Line Preliminary Impact Assessment, a process which included widespread consultation with communities across the affected area.

That particular railway route also included the current route, and the findings of those consultations have been accessed. The details in that report (the Preliminary Environmental Impact Assessment for the Katima – Cape Fria Railway Line) were assessed and further refined in the context of the TZR route and are discussed in the sections below. Where required, further work in the next phases of the project is also included in this section.

5.3.1 Land Clearing

Clearing of land in the state forest and conservation areas for railway reserve, access roads, bridges, borrow pits, cuttings, and construction camps etc, causing:

Loss of biodiversity (range restricted, endemic, protected plant species)

Loss of habitat for wildlife

Table 5-2 provides an estimate of the total distances and extent of undeveloped land along the route. This is land which is used for grazing, but which is otherwise assumed to be fairly undisturbed and therefore original habitat. A total of 3,026 Ha of habitat will be cleared for the servitude. This excludes the effect of habitat fragmentation, i.e. habitat not directly affected but cut off from larger undisturbed areas and therefore breaking up the undisturbed portions that function as an ecological unit. This effect has been minimised on the project by keeping the route aligned with other infrastructure corridors.

Table 5-2: Estimated distances and extent of undeveloped land used for grazing, but otherwise unaffected habitat

From	To	Distance [km]	Green Fields [hA]
Mururani	Rundu	106.2	531
Rundu	Kambowo	15.2	76
Kambowo	Kaiango Turn	16	80
Kaiango Turn	Mbaushe Turn	27.95	140
Mabushe Turn	Nyondo Turn	24.25	121
Nyondo Turn	Kayaru	27.65	138
Kayaru	Kapako Turn	57	285
Kapako Turn	Divundu (D3431 Turn)	25.7	129
Divundu (D3431 Turn)	Kongola	193.5	968
Kongola	-	14	70
-	Mbozi	23.2	116
Mbozi	Kasheshe	58	290

From	To	Distance [km]	Green Fields [hA]
Kasheshe	Katima (Urban start)	16.5	82.5
	TOTAL	605.15	3026

Habitat destruction is particularly of concern in the protected areas, and along the Kwando, Zambezi and Okavango River crossings. The Consultant has prepared a final route that minimizes clearing habitats in vegitation which would be further fine-tuned at the detailed design stage.

Should the line be connected into Zambia, the crossing at Zambezi will also be implicated. Though not the remit of this study, constructing a railway crossing over the Zambezi that is adjacent to the existing road crossing at Katima Mulilo should be considered and further studied.

5.3.1.1 Mitigation

The below describes mitigation measures towards minimizing the adverse environmental impacts from land clearing:

Involve a botanist and ecologist to assist in the detailed alignment across the rivers and elsewhere along the route where there is sensitive habitat

Involve a botanist and ecologist to determine the final extent of plant and habitat loss

Use existing corridors and already cleared areas where possible

The specalists are to divise a restoration plan for significant losses at borrow pits, river crossings and critical habitats – all such areas are to be identified in the full ESIA specialist study

Strict control to remove only the necessary plant cover during construction

Work with communities to fully utilise the wood resources removed from the area

According to IFC/Word Bank Standards, a Critical Habitat assessment will be required for the protected area.

5.3.2 Construction Activities

Uncontrolled, indiscriminate, or unplanned construction activities, or illegal activities done by the construction teams, will cause unnecessary negative impacts on the ecology and on livelihoods.

In this regard the project area communities had the following concerns during the the Preliminary Environmental Impact Assessment for the Katima Mulilo – Cap Fria Railway Line assessment:

- Potential effects on fauna and flora, including increased poaching in wildlife-rich areas
- potential problems with wildlife e.g., elephants and buffalo

- Possible disturbances to rare species along the route
- Deforestation within Kavango and Zambezi regions
- Impact on communal subsistence lifestyle and culture
- Impact on tourism industry, conservancies, and other protected areas; aesthetic impacts on pristine wilderness areas
- Consumption of natural resources needed during construction e.g., use of wood fuel; and
- Potential pollution from spilled oil, diesel, and other contaminants especially in rivers and wetlands as well as of vulnerable aquifers such as the Karstveld around Grootfontein.

5.3.2.1 Mitigation

Unsupervised construction activities can cause irreparable damage to the area, but can be avoided and managed through a thorough ESMP implemented throughout all phases of the project.

There should be Environmental Control Officers appointed for the duration of the construction contract, which should be monitored, and corrections continuously made. The Contractor needs to prove its compliance history on other projects and should have a reputation of dealing with a large contract of this nature, including labour-based/maximised (contracts that use manual labour either completely or to a large extent) contracts.

5.3.3 Water Resources

Large volumes of water are required for the construction phase. In previous projects of similar nature in rural communities, the following issues became apparent:

- Political pressure to maintain water points that have been created temporarily for construction, so that they become permanent features, and attract human settlement in areas that should be left natural
- Borehole yields being exceeded affecting the resources of farm owners and their livelihoods

This concern was raised by the communities in the Preliminary Environmental Impact Assessment for the Katima Mulilo – Cap Fria Railway Line assessment and should be considered during the full ESIA. Water sources will probably vary depending on the locality along the route.

5.3.3.1 Mitigation

Hydrological studies need to be done to identify sustainable water sources, and to use existing water points where possible.

5.3.4 Wetland Dynamics

Railway constructoin and operating activities may have adverse effects on wetland dynamics, especially interference with episodic high flows at the Kwando River crossing . This impact may

occur when water flow is restricted at the river crossing, through the provision of too little culverts or culverts misplaced across the main river and its flood plains. Cutting off seasonal water flow from the flood plains would negatively influence the ecology of such systems.

5.3.4.1 Mitigation

Involve a hydrologist when developing the full ESIA to assess the effectiveness of the structures at the river crossings, to accommodate the flow dynamics of the rivers.

5.3.5 Wildlife Corridors in the Zambezi Region

It is a concern that the raised railway line will disturb or cut off altogether the existing wildlife corridors that exist for larger mammals especially elephants, particularly in the Bwabwata National Park. It is known that animals move freely from north to south across the existing national road through the Zambezi region where the railway line will be routed.

Unlike the level crossing of the road, the railway line will create a raised barrier. There may be a slight chance of animal-train collisions, but the priority concern is that the raised barriers inhibit the free crossing of the animals across the transport corridor.

5.3.5.1 Mitigation

The preliminary design has accounted for 'eco-crossings' so that wildlife can continue to move between north and south of the alignment in the Zambezi region. At the full ESIA stage, the matter would need to be further investigated by an expert familiar with the movements of the wildlife in the area. The expert's objective would be to confirm the design, number and placement of such crossings to be included in the final designs.

5.3.6 Land Acquisition and Involuntary Resettlement

Stakeholders and communities are naturally always concerned that many households will be displaced to make way for the railway line. In the Preliminary Environmental Impact Assessment for the Katima Mulilo – Cap Fria Railway Line assessment and from experience, communities are of the opinion that families affected in this way should be compensated in such a manner that they are in the same position as before the development.

Table 5-3 below provides estimates of the number of formal and informal households affected and the associated costs for compensation. These are based on Namibia's current compensation policy.

Table 5-3: Estimated numbers and financial implications of the compensation, calculated for the affected formal and informal households along the preferred route.

			Quantity					Cost (N$ million)						
		Distance	Formal Settlements (No.)	Informal Settlements (no.)	Wire Fencing (m)	Wood Fencing (m)		Cultivate Land (%)	Formal Settlements (No.)	Informal Settlements (no.)	Wire Fencing (m)	Wood Fencing (m)	Fruit Trees	15% Disturbance
Optimised Route														
Mururani	Rundu	106.2	119	199	4540	12346		1.07	8.96	1.12	0.48	1.11	0.96	2.05
Rundu	Kambowo	15.2	0	0	1520	0		0.17	0.00	0.00	0.16	0.00	0.00	0.05
Kambowo	Kaiango Turn	16	8	64	0	2640		0.24	0.60	0.36	0.00	0.24	0.22	0.25
Kaiango Turn	Mbaushe Turn	27.95	0	0	0	0		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mabushe Turn	Nyondo Turn	24.25	0	0	0	0		0.24	0.00	0.00	0.00	0.00	0.00	0.04
Nyondo Turn	Kayaru	27.65	207	180	0	4701		0.52	15.55	1.01	0.00	0.42	1.16	2.80
Kayaru	Kapako Turn	57	0	0	0	5558		0.25	0.00	0.00	0.00	0.50	0.00	0.11
Kapako Turn	Divundu (D3431 Turn)	25.7	0	0	0	0		0.32	0.00	0.00	0.00	0.00	0.00	0.05
Divundu (D3431 Turn)	Kongola	193.5												
Kongola	-	14	98	35	1120	2240		0.14	7.35	0.20	0.12	0.20	0.40	1.26
-	Mbozi	23.2	0	0	0	0		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mbozi	Kasheshe	58	0	0	0	0		1.02	0.00	0.00	0.00	0.00	0.00	0.15
Kasheshe	Katima (Urban start)	16.5	0	0	0	0		0.12	0.00	0.00	0.00	0.00	0.00	0.02
			433	478	7180	27484		4.1	32.5	2.7	0.8	2.5	2.7	6.8
							Total Cost Estimate (N$ million)							**52.0**
							Rounded Total Cost Estimate (N$ million)							**60.0**

5.3.6.1 Mitigation

Considering the state's positive experience with resettlement compensation on road projects, land acquisition and resettlement for the proposed TZR should not be an issue so long as the following mitigation measures are in place.

The very first mitigation process is clearly communicating and disseminating project information regarding land requirements and resulting compensation to the community through the proper cultural channels (i.e., traditional leader, headmen). As part of the communication, any concerns should be addressed directly.

Those affected should be reinstated in the same position as they were before the introduction of the line. This calls for a flexible policy that is carefully implemented to ensure that those that are most vulnerable are especially cared for. It should take human nature into account and be wary of pure monetary compensation. As a guideline a suitable and sustainable compensation policy may rest on three pillars:

- Monetary compensation for the better-off
- Monetary compensation combined with assistance for those who are not fully able to handle the process themselves

- Reinstating homesteads on behalf of the vulnerable such as the aged, single head of households, the disabled, households living with HIV/AIDS or other terminal illnesses.

There should be negotiations with the community leaders to find alternative land for the affected households (the family unit occupying a homestead or structure, whether formal or informal, that will be affected by the railway servitude) that would suit their needs. This should be facilitated by the consultant team responsible for the implementation of the project.

Compensation for fruit trees is currently monetary, i.e., a rate per fruit tree is provided for every household that loses such a tree. However, this needs to be re-considered also in terms of its sustainability, i.e., if there are alternative ways of compensating the losses that would enable the family a sustained livelihood such as monetary compensation and replacing the fruit tree where there is water.

The study to determine impact on should be completed according to IFC/World Bank Standards to incorporate policies for involuntary resettlement and compensation issues and will include stakeholder engagement set up to reach those directly affected, as well as a resettlement action plan for the ESMP.

Should fields be taken up by the railway reserve, reinstating these to put residents at the same status they would entail:

- Finding suitable fertile land with the inputs of the traditional leadership
- Clearing the land from natural vegetation
- Rebuilding the fence around the field

As is the case with homesteads, households should be differentiated in terms of their ability to reinstate the fields themselves. In addition, care should be taken to ensure that the new fields are ready for cultivation before the existing fields are taken up. The compensation policy should have the same elements as for the compensation for homesteads and special care should be taken to ensure that vulnerable households are duly assisted. Where the reserve cuts larger fields in two portions it can also be negotiated that both sides of the reserve be fenced and the portion outside the reserve is used for cultivation provided that both portions are reasonably accessible. Compensation can then be paid on the portion taken up by the reserve.

Namibia has a compensation policy according to which compensation and resettlement in Namibia is undertaken on road and other infrastructure projects. This policy is dated several years back and seems to provide only guidelines for monetary compensation. It is recommended that this policy be revised to update its rates and in terms of its compensation guidelines, rates, engagement methods, to bring these in line with current sustainability concepts regarding social impact mitigation.

5.3.7 Community Access to Water

Communities were previously concerned that the railway line will cut them off from direct access to water points. A water point on one side of the railway line will make it difficult and dangerous for both people and livestock to cross the line to reach the water point on the other side of the line. They also fear that this may lead to both human and livestock casualties. Their concerns are valid.

In cases where the railway line influences the social catchments of water points, it is important that the water point then be modified to provide water on both sides of the line.

Although limited, the railway line will – in some cases - also severe grazing areas and livestock will need to cross the railway line to access grazing on the opposite side. Livestock herding practices have and are still changing and livestock is seldom herded permanently. Herds will be left on their own to cross the line at will. Villagers are concerned that this will lead to livestock being killed by the train, which in turn will have a negative influence on their livelihoods.

5.3.7.1 Mitigation

Concerns regarding community access to water needs to be studied in greater depth for each area affected along the route, with crossings, water points and other solutions tailor made in consultation with the affected communities.

5.3.8 Employment

The project is likely to yield much needed employment opportunities in the midst of a national economic slump. Very little formal opportunities are available in most rural villages, settlements, and towns. However, people are afraid that the work will not be labour based/maximised or that it may be given to people from outside their areas and that they will not benefit from it in a significant way. While there have been projects in Namibia benefitting local people in a significant way, communities often also cite examples where this is not the case. Labour influx is a well-known problem on large projects and may also occur on this project in case significant external labour is allowed.

Closely related to outside influence on cultural norms and values, people are worried that social ills such as crime and violence, alcohol abuse and commercial sex work or sexual contact with outsiders will increase because people from outside whom they do not know will come into their areas. The unemployed youth may be the most vulnerable to come under bad influences. With this concern can be added the potential spread of HIV/AIDS and other diseases.

5.3.8.1 Mitigation

To ensure the maximum benefit in terms of employment and secondary opportunities are offered to the local communities and to avoid outside influence, it is recommended that the project be mostly labour-maximised. It is recommended that the railway line be divided into sections and that labour from each section be sought from the people living along that section, for higher density areas. For protected areas and commercial farms, the nearest labour can be utilised. A recruitment plan should be submitted by the Contractor, and this should satisfy World Bank standards and the local Labour and Health and Safety Regulations. Communication with communities on this matter to ensure realistic expectations of job opportunities to those outside the area should be part of the process. The local and regional authorities and the traditional leaders should be made part of the recruitment process.

5.3.9 Built Heritage and Cultural Sites

People from the affected communities feel very strongly about their graveyards and individual graves and in the previous study people in the Zambezi Region indicated that these sites should

be avoided at all costs and that they will not accept any compensation for it – grave sites may not be touched.

5.3.9.1 Mitigation

- With the avoidance of denser settled areas, grave sites will also need to be avoided.
- During the ESIA affected communities need to be consulted about the localities of potential grave sites and these avoided as a matter of priority. Otherwise, the National Heritage Council should be involved to assist in resolving sensitive cases.

5.4 Next steps

This environmental and social assessment is preliminary in nature and is based on desk research and the Consultant's prior related experience and reporting in the project area. While most of the information is inherently true and the principles remain relevant, it will have to be refined and updated. Control measures need to be spelt out and made mandatory for the contractor and the operation and maintenance team to ensure the project brings mostly benefits to Namibia and does not bring the affected society and its environment into an environmental deficit.

The following specific steps need to be taken concerning the environmental and social assessment:

1. Employ an experienced and qualified Environmental Assessment Practitioner (EAP) and applicable specialists, which includes a strong team that is familiar with Namibian conditions and legislation.
2. The Terms of Reference is for an Environmental Impact Assessment (EIA), which for the sake of complying with international lending qualifications is termed an ESIA (Environmental and Social Impact Assessment) and ESMP (Environmental and Social Management Plan). The ESIA should comply with local environmental management legislation (Environmental Management Act (2007) and Regulations (2012). It should also comply with international lending requirements for environmental assessment (IFC – Performance Standards for Environmental and Social Sustainability/World Bank Group – Environmental and Social Standards (ESS))[12]. The preliminary impact assessment conducted for this assignment should be given to the Consultant as reference, as well as the preliminary impact assessment completed for the proposed Katima Mulilo to Cape Fria railway line (2006).
3. The formal ESIA process should be preceded by refinement of the route, which at this stage, has been determined to a feasibility level. The EAP should be involved to refine the route so that the avoidance of environmental and social challenges is further optimised. Listed activities (according to the Schedule of the Regulations that require EIA) should be specifically identified for the project, which does not only include inter alia, the railway line, but also boreholes, sewerage facilities, and borrow pits. In particular, borrow pits

[12] https://www.ifc.org/wps/wcm/connect/24e6bfc3-5de3-444d-be9b-226188c95454/PS_English_2012_Full-Document.pdf?MOD=AJPERES&CVID=jkV-X6h; https://www.worldbank.org/en/projects-operations/environmental-and-social-framework/brief/environmental-and-social-standards

will require their own scoping studies and EMPs and need to be submitted separately for environmental clearance, according to current procedures at the office of the Environmental Commissioner. The locality of the borrow pits which should avoid prominent areas in view of road users, sensitive ecological zones, along with general management principles should be considered in the overall ESIA.

4. The ESIA should include, as a minimum, the following specialist area:

    a. Legal and regulatory requirements: the mentioned standards need to be studied in detail, as well as other environmental and social legal instruments that are applicable in the project context. They need to be included in the ESIA report in a practical manner and the relevant requirements carried forward to the ESMP.

    b. **Stakeholder engagement and Information disclosure** – World Bank ESS10 is applicable. For this project, stakeholder engagement needs to be tailored to reach particularly the directly affected communities and stakeholders. A Stakeholder Engagement Plan needs to be prepared and submitted which spells out the stakeholder mapping, how they can be effectively engaged and how information will be disclosed during the assessment process. The Regulations of the Environmental Management Act are also applicable, although they will not be sufficient to adequately reach the stakeholder groups of the project area. For the ESIA process, community leaders need to be identified who can adequately represent the needs and convictions of the people. A process to hear a representative proportion of all voices, such as a Rapid Rural Appraisal (RPA) should be employed.

    c. Cultural Heritage – The National Heritage Act is applicable, as well as the World Bank Environmental and Social Standards - on this project in particular, graves and grave sites need to be meticulously identified in consultation with the affected persons, the traditional leaders and in consultation with the National Heritage Council.

    d. Indigenous peoples and vulnerable groups – vulnerable groups on the project need to be identified and actions taken to include them during consultation and to ensure they benefit equally from the project and that their vulnerabilities are taken into account during the recruitment process. Refer to ESS7 of the World Bank. The ESIA and ESMP should have specific sections reporting on the identification of these groups and how they have been accommodated to participate during the process and how they will be included to benefit from the project.

    e. Land Acquisition, Restrictions on Land Use and Involuntary Resettlement - these are major themes on this project. Some preliminary comments have been made on the potential implications of the project in this regard. A Social Impact Assessment needs to be included in the ESIA, which is efficiently interactive with the affected communities. The social consultant should be a senior expert and be experienced in local community consultation. The consultant should also be familiar with IFC/World Bank Standards with regards to resettlement action plans, sustainable compensation issues, and the ESS applicable in this regard.

f. Biodiversity Conservation and Sustainable Management of Living Natural Resources – the route is known to be in a high value conservation area with some preliminary comments made to this effect in this document. Issues highlighted including impacts on wildlife movements and potential collisions, and impacts on tourism, protected areas, habitats, and biodiversity need to be investigated in detail. The proposed river crossings need to be considered in detail from an ecological perspective and refined/adapted where needed. ESS6, as well as various local legal and international instruments are applicable.

g. Resource Efficiency and Pollution Prevention and Management – This ESS should be applied in general. In particular, potential water quality and resource impacts on the groundwater in the Karst area, other groundwater sources and on the rivers in the north eastern section of the route should be considered in particular.

h. Labour and Working Conditions – the ESIA Team should investigate and describe in the ESIA and ESMP, in conjunction with the engineering team, how the contract will be structured to ensure the local people are optimally benefitted by the project.

The guidelines provided above are not necessarily complete. It is recognised that the affected communities and stakeholders may identify issues not yet considered here. Therefore, the Terms of Reference should be flexible to allow for additional issues that need to be investigated.

6 Legal and Regulatory Assessment

6.1 Introduction

As part of the feasibility study, the aim of the legal and regulatory assessment is to ensure that the project is developed and procured in accordance with local (current) legal requirements. These assessments are discussed in this section.

6.2 Approach

This section highlights relevant applicable legislation and policies that may impact the framework under which the project is to be developed and procured.

6.2.1 National Transport Services Holding Company Act, 28 of 1998 (the "Holding Company Act")

The Holding Company Act serves to provide for the incorporation of a holding company, in this instance, TransNamib Holdings Limited ("TransNamib"), to undertake, either by itself or through any subsidiary company, transport services in Namibia or elsewhere, which serves as the main objective of the holding company, The Holding Company Act serves as sole legislation regulating rail in Namibia and confirms the establishment of TransNamib as a self-regulating body in respect of management, safety, operations, accident, and incident investigations and as the sole provider of rail transport services in Namibia, with added oversight from its board and the Minister of Works and Transport (the "Minister").

The secondary objectives of TransNamib are to manage and develop, either by itself or through any subsidiary company, immovable property, including such property as may be transferred to it, doing so on a commercial basis.

TransNamib has the power to enter into an agreement with any person, organisation or authority to perform a particular act or to render a particular service on behalf of or in favour of or to the benefit of TransNamib and in writing, delegate any of its powers, including a delegated power, to any person, organisation or authority contemplated hereinbefore, if it considers it necessary for the efficient performance of any act or service so contemplated.

Section 14 (1) (a) provides for the transfer of ownership in all the movable and immovable property, the assets and liabilities, and the rights and obligations, to TransNamib. With certain exceptions, "railway" is specifically excluded from such transfer of ownership to TransNamib, ownership of which vests in the State. In this instance "railway" means, any main railway line and the railway reserve fences, including any such railway line in any station or siding and all rails and check rails, jointing materials of rails, sleepers and longitudinal ties, fastenings, ballast stone, turnouts, stop blocks, turntables, clearance marks, derailing devices and small fittings of that line of the railway, and any signaling system including all rail track regulatory signs, warning signs and information and guiding signs on or in respect of that line of the railway, which vest in TransNamib on the transfer date.

In terms of section 13 of the Holding Company Act, the State and TransNamib may furthermore agree in writing that the railway be managed by TransNamib, which agreement may include

terms that relate to the compilation and publication of railway procedures and design improvements to existing lines of the railway. It also empowers TransNamib to conduct the business of transporting passengers or goods on or by means of the railway.

In addition, the Minister may direct the minimum maintenance standards for purposes of achieving and maintaining a safe and functional railway and to protect the environment. Subsequently, TransNamib will be held responsible for the costs incidental to the maintenance of the railway. Claims for damages in respect of the management or failure thereof by TransNamib, will be instituted against it.

The 'management' of a railway is regarded as the planning, design, construction, maintenance (which refers to repairs) and control of the railway.

Statutorily TransNamib will play a significant role in the planning, design, construction, maintenance, control and development of the Trans-Zambezi Railway Corridor notwithstanding the fact that railway vests in the State.

6.2.1.1 Railway Management Agreement (the "Agreement")

Pursuant to section 13 of the Holding Company Act an agreement was entered into on or about 1 April 1999 between the Government of Namibia and TransNamib to fulfil the objectives of the aforesaid Act. The Agreement by and large provides for maintenance work on the existing railway in accordance with certain minimum standards and includes the replacement or repair of railway material.

Clause 2.5 of the Agreement relates to control of maintenance, a clear duty and cost implication that is placed on TransNamib, to manage the requisite inspections and condition appraisals of the railway.

Finally, the Agreement governs the financing aspect of routine railway maintenance, proper accounting and reporting to the Minister.

6.2.1.2 The 2018 Namibian Transport Policy

In terms of the 2018 Namibian Transport Policy, the current rail management arrangement is not compliant with administrative law, as TransNamib is a functionary in the areas of railway operations and management, as well as responsible for oversight of these activities. As such, since TransNamib is currently "a judge in [its] own case", the situation is not compliant with administrative law.

As part of its development strategy, the Policy suggests a separation of infrastructure from operations. Specifically, the suggestion is for the Namibian government to retain the responsibility of developing the appropriate railway infrastructure and to engage the private sector in railway operations.

The Policy suggests that an institutional restructuring of the present rail sector is needed, which will be linked to the legislative changes, to provide for among other things, open network access. This will require the promulgation of new legislation permitting any enterprise to operate a rail service on the Namibian rail network and in a regulated, competitive environment, legislation that provides for the separation of regulatory functions from operational functions, and

provision for anti-competitive measures to be imposed on rail operators, a rail operator licensing system and rail safety regulation.

The Policy further proposes the establishment of a Rail Infrastructure Bill to clarify the ownership of the rail network and enabling an Infrastructure Manager to enter into public private partnerships to perform its functions.

6.2.2 The Namibian Transport Advisory Board Act 23 of 1991

This Act provides for the establishment of the Namibian Transport Advisory Board (the "Board") and the composition and functions thereof.

The objects of the Board are to develop, promote and encourage transport in Namibia and to co-ordinate transport services in Namibia to ensure that transport services are carried on and maintained in, from or to Namibia in the best interest of Namibia and its inhabitants in the most effective and economic manner.

As part of achieving the objects of the Board, it is tasked with making investigations and advising the Minister of Works and Transport on:

- Policies that should be followed and implemented in Namibia in relation to transport
- The appropriate choice and combination of infrastructure investments, rail as well as road, transport system development, commercial and economic viability of different solutions and financial arrangements for infrastructure investments
- Measures that are necessary to co-ordinate transport services in Namibia
- Any matter which in the opinion of the Board is connected therewith or that is assigned to the Board by the Minister

Having regard to the above, we surmise that the Board is created with the purpose of coordinating transport services and management efforts in Namibia and advising on key policies surrounding transport. This specifically includes railways.

The Board has the power to conduct investigations to achieve its objects, but its core function is to serve as advisor to the Minister. It does not have statutory power to be consulted over or approve public procurement processes or the creation of a public private partnership to implement the Project. In either instance however, the Board has the power to make investigations and to advise the Minister accordingly.

6.2.3 The Public Private Partnerships Act 4 of 2017

With the introduction of the Public Private Partnerships Act (the "**PPP Act**") in 2017, the Government of Namibia advanced its stated policy objective of providing the principles, framework and guiding procedures that is to assist Government agencies in applying PPPs across Namibia.[13] Establishing a clear, predictable, and legitimate institutional framework is a critical success factor for PPP projects and is vital for encouraging private sector engagement.

[13] *See* Namibia Public Private Partnership (PPP) Policy, Ministry of Trade and Industry at Section 1.

The PPP Act applies to the initiation, preparation, procurement, management, and implementation of PPP projects, which are defined as any project with the following elements are present:

a) a private entity provides public infrastructure assets or services for use (directly or indirectly) by the public.

b) the private entity will take on investments in, and management of, the infrastructure assets or services for a specified period.

c) risk, optimally, would be shared between the private entity and the public entity.

d) the private entity receives performance-linked payments.[14]

Under the PPP Act, a "public entity" is defined as any office, ministry, or agency of the Government of Namibia, including all local authorities and regional councils, public enterprises, or a body or trust established by statute or owned or controlled by the Government. For purposes of developing the Project, the Ministry of Works and Transport would be the appropriate public entity to initiate, prepare, procure, manage and implement a PPP project.

In terms of the PPP Guidelines, a PPP will be based on the following essential elements:

iv) a contractual arrangement
v) substantial risk transfer, and
vi) outcome-based financial rewards to the private sector.

Furthermore, the principle features of PPP include the provision of a service that will involve the creation or use of an asset involving private sector participation, a contribution by the State through for instance land, capital works, risk sharing, revenue diversion, purchase of the agreed services or other supporting mechanism; and the private sector receiving payments from government and/or through user charges or third party revenues that will be contingent on the private sector's performance in supplying the related services or facilities.

The PPP Act does not, however, apply to the procurement of goods, works or services contemplated under the Public Procurement Act.[15] This is in fact the only exception from the PPP Act.

PPP Entity

The PPP Act is silent on how to constitute PPP entity. Specifically, the PPP Act does not stipulate how the relationship should be put together i.e., by way of JV (incorporated or unincorporated), SPV or otherwise.

However, this does not mean that a PP entity may not be constituted but rather, some flexibility is provided for in the design of the corporate structure for a PPP project.

As the key legislative provisions of Namibian PPP Framework are contained in the PPP Act, this

[14] *See* PPP Act at Section 1, definition of "public private partnership agreement".
[15] *See id.* at Section 3(2).

section of this Report provides an overview and concise analysis of the PPP Act once a public entity such as the Ministry of Work and Transport has identified a project it intends to implement as a PPP project (see Table 6-1 below).

Table 6-1: Project Steps as per the PPP Act

	Steps	Relevant authorities	Comments
1.	**Registration of a PPP project (Art. 16)** A public entity (in this case, the Ministry of Works and Transport): (a) may propose a public private partnership project. (b) must designate a project officer within the public entity to be responsible for the project. (c) may appoint a transaction advisor with the appropriate skills and expertise to prepare a feasibility assessment, prepare a PPP agreement and assist and advise the public entity in implementing the project; and (d) must register the PPP project with the Committee.	The Public Private Partnership Committee[16]	The process is led by the relevant accounting officer, supported by a project officer in the Ministry of Works and Transport. Presumably, any project to be registered has undergone a basic screening, and evaluation has been structured and outlined.
2.	**Preparation of feasibility assessment (Art. 17)** A feasibility assessment must be undertaken to determine if the PPP project is in the public interest (e.g., value-for-money, costs, market demand, user fees, budgetary limits, risks in terms of financial commitments, indirect or contingent liabilities, etc.)[17].		This feasibility study would build upon all prior analysis and include the information required by Article 17.

[16] The Public Private Partnership Committee is established in terms of section 5 of the PPP Act. It obligations are to provide for transaction approvals in respect of public private partnership projects, develop best practice guidelines in relation to all aspects of public private partnership projects; advise the Minister of Finance on policies relating to public private partnership projects; oversee the functioning of the Directorate of Public Private Partnerships within the Ministry and to exercise powers imposed on and perform functions assigned to the Committee in terms of the PPP Act.

[17] The PPP Act does not define the meaning of "public interest" but the PPP Guidance Manual emphasizes the assurance that procuring the project as a PPP is not contrary to public interest; and after a decision has been made to procure a project as a PPP, ensuring that the procurement process is structured to ensure that the project continues to be in the public interest.

	Steps	Relevant authorities	Comments
3.	**Approval of feasibility assessment by the Committee (Art. 18)** (a) The feasibility report must be submitted to the Committee for approval. (b) The Committee must submit details of governing funding requirements to the Treasury and obtain clearance on the acceptability of government funding commitments. (c) The Committee may: (i) approve the feasibility assessment in consultation with the Minister and inform the public entity in writing (**Transaction Approval 1**), or (ii) not approve the feasibility study and provide written reasons to the public entity.	(i) Committee (ii) Treasury (iii) Minister of Finance (Minister)	Positives: written reasons will be provided in the event of rejection.
4.	**Request for qualification stage (Arts. 20-24)*** (a) The project officer must submit the request for qualification to the Committee for approval. (The request sets out the infrastructure assets or services the public entity intends to obtain as well as the proposed timeframes and qualification criteria, for the purpose of ascertaining the level of interest in the PPP project and providing an avenue through which bidders can comment on the proposed PPP project) (b) The Committee may approve the request for qualification with or without changes to the request for qualification (**Transaction Approval 2A**). (c) The procurement committee must evaluate the applications using the criteria determined at the time of the issuing of the request for qualification. (d) The project officer must promptly and in writing notify each applicant whether it has qualified for the next stage. * May be combined with the request for proposal stage for PPP projects with low project value (Art. 20(2)).	Committee	The Act does not give guidance on the appropriate timeframes or qualification criteria. Positives: unsuccessful applicants may request the names of applicants that have qualified.

	Steps	Relevant authorities	Comments
5.	**Request for proposal stage (Arts. 25-26)** (a) The project officer must submit a draft PPP agreement to the Attorney-General for approval. (b) The project officer must submit the request for proposal with the draft PPP agreement to the Committee for approval. (The request formally solicits bids for the PPP project and sets out the criteria and method to be used for evaluation of bids) (c) The Committee may approve the request for proposal with or without changes to the request for qualification (**Transaction Approval 2B**).	(i) Attorney-General (ii) Committee	
6.	**Evaluation of bids (Arts. 27-28)** (a) The procurement committee must evaluate bids using the criteria determined at the time of issue of the request for proposal and keep minutes of the proceedings. All bidders that meet the threshold criteria must be ranked and the first-ranked bidder must be referred to as the preferred bidder. (b) The project officer must submit an evaluation report to the Committee for approval and include therein that the criteria of affordability and value for money were applied and whether the same were satisfied in the preferred bid. (c) The Committee, in consultation with the Minister, may approve the report with or without changes (**Transaction Approval 3**).	(i) Committee (ii) Minister	Other than affordability and value for money, no other requirements are specified.
7.	**Giving notice to bidders (Art. 29)** (a) The project officer must in writing inform all bidders of the preferred bidder. (b) Unsuccessful bidders may within 10 days submit queries to the public entity regarding the bid evaluation process.		

	Steps	Relevant authorities	Comments
	(c) After the 10-day period, the chairperson of the procurement committee must issue a letter of award to the preferred bidder. (d) The preferred bidder must within 10 days of receipt sign and submit the duplicate copy to the chairperson of the procurement committee.		
8.	**PPP Agreement (Part 6)** (a) The public entity must obtain the Attorney-General's approval of the PPP agreement. (b) The Committee in consultation with the Minister may approve the PPP agreement, the public entity's management plans, satisfactory due diligence on the public entity and proposed preferred bidder (**Transaction Approval 4**). (c) The public entity must establish a management team, including the project officer, and headed by a manager assisted by a team with financial, technical and legal expertise. (d) Only the accounting offer (and additional signatories from the public entity as required by applicable laws) may enter into the PPP agreement on behalf of the public entity.	(i) Attorney-General (ii) Committee (iii) Minister	
9.	**Management (Art. 34)** The management team must prepare a management plan.		

For the purposes of project feasibility, the Ministry of Works and Transport may consider PPP as a procurement option for the project.

The PPP Act does not make provision for a closed set of categories or circumstances under which PPP as a procurement method must be preferred. Rather, during the procurement options analyses stage, the Ministry of Works and Transport will be tasked to verify the project characteristics to ascertain the suitability of PPP per se as a procurement option. It is only during the feasibility stage that the precise delivery mechanism will be addressed.

As such, PPP may indeed serve as a procurement option for the Project, aside from public procurement, as provided for under the Public Procurement Act, which is discussed more fully herein below.

Under the PPP Guidance Manual some structures would be considered PPPs for the purposes of the PPP Act and PPP Regulations. These include:

- Build Lease Transfer (BLT) / Build Own Lease Transfer (BOLT)
- Build Transfer Lease (BTL)
- Design Build Operate (DBO)
- Build Operate Transfer (BOT) / Design Build Finance Operate Transfer (DBFOT)
- Build Lease Transfer (BLT) / Build Own Lease Transfer (BOLT)
- Build Transfer Lease (BTL)
- Design Build Operate (DBO)
- Build Operate Transfer (BOT) / Design Build Finance Operate Transfer (DBFOT)

The evaluation criteria used for selecting delivery models for a proposed project comprise the potential to deliver value for money, the type of solution, the delivery model options.

The following types of arrangements ought not to be construed as PPPs:

- Any Engineering Procurement Construction (EPC) contract, where payments are deferred or on percentage completion of work or other terms, and where the management or operations and maintenance of the asset is not retained by the private sector after three years from completion of construction.
- Any arrangement for supply of goods or services for a period of up to three years.
- Any arrangement or contract that only provides for a hire or rent or lease of an asset belonging to a public entity without any performance obligations and other essential features of a PPP.
- Any typical traditional/conventional design and construction public procurement arrangement (typically of two to four years).
- Any outsourcing or privatization arrangement primarily characterised by increasing private sector delivery and reduction of government service delivery.

6.2.4 The Public Procurement Act (the "PPA")

The PPA sets forth the statutory framework for all procurement of goods, works and services and disposal of assets undertaken by the Central Procurement Board of Namibia (the "Board") or a public entity. The PPA Act defines a "public entity", amongst other as "a body or trust that is owned or controlled by the Government…". By virtue of section 2 (a) of the Act, the Ministry of Works and Transport as well as TransNamib are 'public entities' and when they procure goods, works and/or services, such actions are subject to the PPA.

PPP Exemption under the PPA

There is no need for PPP exemption from the provisions of the PPA. Either of the two statures will apply, depending on the procurement method that is chosen.

If the Project is identified as a PPP, the Central Procurement Board of Namibia will not have statutory power to deal with the project. That will be left for the PPP Unit as it has the statutory mandate to deal with PPPs

The fundamental principles that govern procurement, include as a minimum, the principle of transparency, integrity, competitive supply, effectiveness, efficiency, fair-dealing, responsiveness, informed decision-making, consistency, legality, integration, and accountability and such other aspects as the Minister of Finance ("the Minister") may determine.

The Minister may determine the policy on procurement, including procurement preferences, classification and categories of Namibian manufacturers, suppliers, contractors and service providers and the terms and conditions for classification or participation in the procurement process to realize - (a) the greatest socio-economic benefits; (b) the empowerment and advancement of small and medium enterprises and of persons or categories of persons who have been socially, racially, economically or educationally disadvantaged by past discriminatory laws or practices.

Similarly, as is the case under the PPP Act, a public entity must designate an 'accounting officer' or duly competent person who must, in the prescribed manner, set up an internal organisational structure which includes a procurement committee, procurement management unit for the conduct and management of procurement and a bid evaluation committee, its functions and responsibilities. The accounting officer is accountable for the full compliance with the PPA, and directives and instructions made under the PPA.

Chapter 5 of the PPA provides for the choice of procurement methods available to the Board or public entity, which include:

(a) for the procurement of goods, works and non-consultancy services, by

(i) open advertised bidding.

(ii) restricted bidding.

(iii) request for sealed quotations.

(iv) direct procurement.

(v) execution by public entities.

(vi) emergency procurement.

(vii) small value procurement.

(viii) request for proposals.

(ix) electronic reverse auction.

The PPA further makes provision for open national and international bidding and the conditions under which each method of procurement may be exercised.

Part 6 of the PPA provides comprehensively for the bidding process in respect of procurement contracts, from commencement with invitations to bidding to the award of procurement contracts.

The realization of the Project may be achieved under the provisions of the PPA as well.

6.2.4.1 PPP Act v. the PPA

As per the financial assessment in Section 3 of this report, it is not likely that implementing the proposed railway in a DBFOT-style PPP would be viable while (a) achieving significant risk transfer to the private sector and (b), in the absence of significant viability gap funding / subsidies from the State in order to make the project viable.

Rather, the most ideal and 'market attractive' structure would see the State fully responsible for developing the TZR and to subsequently grant a concession or access rights to a private operator (or operators) to provide rolling stock and to operate and maintain the railway line in a financially sustaining manner.

In this case, the Project would be achieved under the provisions of both the PPA (to develop railway infrastructure) and the PPP Act (to operate and maintain the railway infrastructure).

6.2.7 Expropriation under the Namibian Constitution

Expropriation may be defined as the power of the state to compulsorily but lawfully, and for reasons deemed to be in the public interest, acquire ownership or some of the powers associated with ownership in respect of property, to the extent that the owner is deprived of the power to use or alienate his or her property as he or she deems fit. Expropriation constitutes a limitation on the right of ownership.

Rights of ownership are guaranteed under the Namibian constitution. In terms of article 16 (1) of the Constitution, all persons shall have the right in any part of Namibia to acquire, own and dispose of all forms of immovable and movable property individually or in association with others and to bequeath their property to their heirs or legatees: provided that Parliament may by legislation prohibit or regulate as it deems expedient the right to acquire property by persons who are not Namibian citizens.

In the Namibian context the legal authority to expropriate is provided for in article 16(2) of the Namibian Constitution. The article empowers the state, or any competent body or organisation authorised by law, to expropriate property in the public interest subject to the payment of just

compensation. So accordingly, the requirements of expropriation involve public interest and just compensation authorised by law. Expropriation may be consensual or where necessary forced. Forced expropriation is only possible in matters involving land rights.

The Constitution however does not define "public interest". Public interest, therefore, is a legal requirement falling within the sphere of political definition. It is therefore the power of the state/government of the day, or of any authorised state organ/authority to determine what constitutes public utility or public interest.

"Public interest" expropriation requires that the expropriation is done for reasons of "public utility" and similar other lawful measures. The furtherance of public interest requires the striking of a fair balance between the demands of the general interest and the requirements of the individual's fundamental rights; and that lawful expropriation must not be discriminatory. Public interest does not mean only considering the interests of the general public; it also involves considering what would be in the interests of the holder of the right to the property that is earmarked for expropriation.[18]

Moreover, the element of public interest requires the application of Article 18 of the Namibian Constitution, which requires the State to act fairly, reasonably and within the law.

In Namibia, the most prominent piece of legislation empowering the State to expropriate private property is the Agricultural (Commercial) Land Reform Act 6 of 1995. In this Act "public interest" has been defined to include agricultural and resettlement purposes in the context of the government's land reform and poverty alleviation programme.

This is important to note since Article 16(2) provides further that expropriation by the State or state organ has to be conducted based on an Act of Parliament. As such, the State is only allowed to deprive the holder of its right to entitlement where there is an enabling Act which provides the State the legal basis to do so.

6.2.8 Expropriation Ordinance 13 of 1978 (the "Ordinance")

At present the Ordinance serves as enabling legislation which provides for the expropriation of land and other property for public and certain other purposes, and for matters incidental thereto "Property" means both movable and immovable property and "immovable property" includes a real right in or over immovable property.

"Public purposes" includes any purposes connected with the administration of the provisions of some or other law by an authoritative body.

The Ordinance came into force on 24 July 1978 and was subsequently amended by National Transport Corporation Act 21 of 1987. The South African Expropriation Act 63 of 1975, which

[18] See Kessl v Ministry of Lands Resettlement and Others and Two Similar Cases 2008 (1) NR 167 (HC)

deals with the expropriation of land (and commenced on 1 January 1977, in terms of RSA Proc. 273 of 1976) once applied to the then Southwest Africa in respect of expropriations by the Railway Administration under section 4 of the aforesaid Act.

Section 4(4) of that Act stated: "The provisions of this section, and the other provisions of this Act, in so far as they are connected with the application of this section, shall also apply in the territory of South West Africa, including the Eastern Caprivi Zipfel", thus making sections 7 to 24 of the Act applicable to expropriations by the Railway Administration in terms of the Railways and Harbours Control and Management (Consolidation) Act 70 of 1957 (which is no longer in force in Namibia). However, section 4 of this Act was repealed by the National Transport Corporation Act 21 of 1987, thus effectively ending the applicability of any part of the Act to then Southwest Africa.

The National Transport Corporation Act, as amended, has been repealed by the Holding Company Act, the consequence of which is that there is no statutory framework for expropriation specifically earmarked for railway, other than by way of the broad application of the Ordinance.

The Ordinance however presents it own shortcomings. The Ordinance vests the power to expropriate in the "Executive Committee". The Executive Committee means the Executive Committee constituted under section 4 of the Southwest Africa Constitution Act, 1968 (Act 39 of 1968). This Act has been repealed by Article 147 of the Namibian Constitution, the effect of which renders the establishment of the "Executive Committee" as administrative functionary to expropriate movable or immovable property pursuant to section 2 of the Ordinance, ineffective. The Ordinance has not been amended to full this void.

This means that there remains a material void in the enforceability of the Ordinance and as such, a lack of a proper statutory framework in the form of an act of parliament which should specifically provide for expropriation for development of railway.

6.2.9 The Environmental Management Act 7 of 2007

The Environmental Management Act 7 of 2007 ("**the EMA**") came into operation on 06 February 2012.[19] It is accompanied by two sets of regulations. The first set of regulations lists the activities that may not be conducted without an environmental clearance certificate,[20] published in terms of section 27 of the EMA. The second set deals with Environmental Impact Assessments ("**the EIA Regulations**") and was published in terms of Section 56 of the EMA.[21] The State is also bound by the EMA.[22]

In terms of the EMA, the "environment" means the complex of natural and anthropogenic factors and elements that are mutually interrelated and affect the ecological equilibrium and the quality

[19] GN 28 of *GG* 4878 of 06 February 2012.
[20] The Regulations published in GN 29 of *GG* 4878 of 06 February 2012.
[21] The Regulations published in GN 30 of *GG* 4878 of 06 February 2012.
[22] Section 55 of the EMA.

of life, including the natural environment that is the land, water and air, all organic and inorganic material and all living organisms and the human environment that is the landscape and natural, cultural, historical, aesthetic, economic and social heritage and values.[23]

The purpose of the EMA, as stated in its long title, is

"*To promote the sustainable management of the environment and the use of natural resources by establishing principles for decision making on matters affecting the environment; to establish the Sustainable Development Council; to provide for the appointment of the Environmental Commissioner and environmental officers; to provide for a process of assessment and control of activities which may have significant effects on the environment; and to provide for incidental matters*."

Against the above purpose of the EMA, the object of EMA is to prevent and mitigate, on the basis of the principles of environmental management, the significant effects[24] of activities on the environment.[25] This is to be achieved by ensuring that the significant effects of activities on the environment are considered in time and carefully, ensuring that there are opportunities for timeous participation of interested and affected parties throughout the assessment process and finally ensuring that the findings of an assessment are taken into account before any decision is made in respect of activities.[26]

Environmental Assessment

The EMA states that the Minister may, after following the prescribed consultative process, list activities which may not be undertaken without an environmental clearance certificate.[27] The listed activities are amongst other, the construction of railways in respect of which an environmental clearance certificate is necessary.

"Activity" means a physical work that a proponent proposes to construct, operate, modify, decommission, or abandon or an activity that a proponent proposes to undertake.[28] "Proponent" means a person who proposes to undertake a listed activity.[29]

If a person undertakes a listed activity without the necessary environmental clearance certificate, that person commits an offence and is on conviction liable to a fine not exceeding N$500,000.00

[23] Section 1 of the EMA.
[24] "Significant effect" means having, or likely to have, a consequential qualitative or quantitative impact on the environment, including changes in ecological, aesthetic, cultural, historic, economic and social factors, whether directly or indirectly, individually or collectively. See section 1 of the EMA.
[25] Section 2 of the EMA.
[26] Section 2 of the EMA.
[27] Section 27(1) of the EMA.
[28] Section 1 of the EMA.
[29] Section 1 of the EMA.

or to imprisonment for a period not exceeding 25 years or to both such fine and such imprisonment.[30]

In preparation for conducting the applicable legal framework, we have collected and listed legislation, regulations and policies that have a primary relationship to PPPs, which include the following, although the list is not exhaustive:

- Companies Act 28 of 2004
- Public Enterprises Governance Act 2 of 2006
- Arbitration Act 42 of 1965
- The State Finance Act 31 of 1991
- The Foreign Investment Act 27 of 1990
- Currencies and Exchanges Act of 1933 and Regulations
- The Insolvency Act 24 of 1936
- The Labour Act 11 of 2007
- Namibia's 5th National Development Plan
- The Harambee Prosperity Plan II
- The Draft NEEEB Bill

6.3 Legal Readiness

There is a need for a more active role to be played by the private sector. In doing so, the administrative shortcoming in TransNamib being a self-regulatory body must be addressed.

Furthermore, to provide more investment certainty to attract more private participation in the railway sector, a clear separation between infrastructure development and operational management on the other hand can be achieved through more comprehensive legislation that provides for the separation of regulatory functions from operational functions.

A legislative framework to allow for expropriation for the specific purpose of railway development will have to be tabled before parliament to consider, to reach the developmental goals of the Project.

[30] Section 27(4) of the EMA.

7 Next Steps & Schedule

7.1 Introduction

From the assessments made in Vol I. and Vol II. of this assignment, it is clear that this project is viable from a technical, environmental, legal, financial and ecnomic standpoint and should move forward.

To move forward, certain 'next steps' are required to ensure that the TZR is successfully developed. These steps are described in this section.

7.2 Extension of Study Mandate

The key conclusion of the assignment is that the proposed 772 km Greenfield line is viable from a technical, environmental, legal, financial, and economic standpoint and should move forward. To realize an interconnected regional railway, it is noteworthy that the Greenfield 'Trans Zambezi Extension Railway Line' should connect to Zambia's and Botswana's rail network, thereby providing direct access to regional railway traffic to the Walvis Bay Port.

Furthermore, the line's traffic potential hinges entirely on its ability to attract regional traffic to and from Walvis Bay Port. To realize this potential, apart from direct regional connectivity; minimising transport costs, eliminating inter-modal transhipments and reducing transit time are critical.

With the above context, there are two major areas which need to be investigated and studied further to correctly assess the line's potential in the current national and regional context, namely (i) 'Seamless Inter-Operability with Namibia's Current Railway Network' and (ii) 'Potential Regional Connectivity Through Botswana'. Both are discussed in detail in the sections below.

There was a broad agreement within the stakeholders during the 'Workshop' on taking up these studies.

On the request of the Ministry, M R Technofin has submitted a task and effort schedule as well as a project timeline for two separate studies. Both studies would be an extension to the current study and would commence on submision of this Final Feasibility Report. On completion of the two 'sub-studies', an updated Final Feasibility Report will be submitted to MoWT.

7.2.1 Seamless Inter-Operability with Namibia's Current Railway Network

Discussions on rail operations and rolling stock requirements in Volume I of the feasibility report have assumed that the current railway line between Walvis Bay and Grootfontein will be upgraded to meet the recommended design specifications of the TZR (namely the 18.5 ton/axle load).

The Trans-Zambezi's commercial potential hinges on seamless train movement between the proposed 'Greenfield' line (Grootfontein- Katima Mulilo) and Namibia's current network between Grootfontein and Walvis Bay. It is noted that with significant freight potential coming from regional transit traffic, through connectivity to and from the Walvis Bay port is immensely important.

Interoperability Issues with the Current Network

Key questions that a 'operational and infrastructure planning' study should address are:

1. Can freight traffic move fluidly between the proposed line and the current network?

2. What are the current operational and infrastructure issues on the existing network and how can they be addressed?

3. If funding paucity is an issue and the Walvis Bay – Grootfontein section cannot be fully upgraded, what are alternative low-cost measures?

4. Can the Walvis Bay – Grootfontein section meet forecasted traffic in 10-, 20-, 30-years? What upgrades would be required to meet traffic down the line?

The Consultant's current scope of work does not include any engineering or operational study of the existing railway network. Furthermore, our findings assume that the existing network between Grootfontein and Walvis Bay would be upgraded to a standard that would allow for seamless movement between the proposed line and the current network.

More specifically, the existing Grootfontein – Walvis Bay railway section has a capacity of 16.5 ton/axle-load and sectional design speeds varying between 50 kmph and 80 kmph. We have assumed that this section would be fit for a 18.5 ton/axle-load and to a design speed of 80 kmph for freight, matching with the proposed Trans-Zambezi railway extension.

The ground realities are that the gradients and curvatures on the existing Grootfontein – Walvis Bay section are areas of concern with gradients much steeper and curves much sharper than what are proposed on the Trans-Zambezi Extension Line.

Furthermore, existing station layouts and inter-distances need to be assessed and modified/upgraded accordingly to increase the 'Line Capacity' of the existing Walvis Bay – Grootfontein section to match the proposed TZR.

The existing 'Railway Workshop' infrastructure also needs to be reviewed to ensure that the augmented workshop is able to cater to the much higher demands of rolling stock maintenance (Locomotive, Wagons, Track Machines, etc.) of the expanded Trans Zambezi Railway network.

A mismatch between existing and new railway section would result in an inefficient transport network with unreliable service standards requiring more trains and rolling stock to meet the

regional traffic requirements. Other inter-operability issues would also be at play such as 'train bunching' at Grootfontein.

The remit of this study does not include studying how traffic to and from the TZR will interact with Namibia's current rail network. However, this does need to be studied in greater detail to minimize interoperability issues between the proposed line and the current line between Walvis Bay and Grootfontein.

The Consultant has offered its expertise and services as an extension of the present mandate for such studies.

7.2.2 Last Mile Connectivity - Potential Regional Connectivity Through Botswana

Though the current assignment is regional in nature, the remit of the current scope of work is limited to looking at a railway line that is within Namibia's borders up to Katima Mulilo. Practically, the proposed line would have to be extended past Katima Mulilo into Zambia or Botswana to establish 'through freight' to eliminate inter-modal transhipments and minimize transit times. The issue is complex, but of great importance if a future rail-based network is to be developed to best effect.

Based on intelligence gathered by the Consultant, it is understood that Botswana and Zambia are currently working bilaterally and are in the final stages of tendering a feasibility study for:

(1) 367 km railway line from Mosetse (Botswana) to Kazungula (Zambia) via the Kazungula Bridge (the bridge was completed in 2021)

(2) 56 km railway line from Mmamabula (Botswana) to Lephalale (South Africa)

In view of this development, the Consultant has found that connecting the proposed line from Katima Mulilo into Botswana via Ngoma (Namibia) is a 'potential' option apart from direct connectivity to Zambia through Katima Mulilo- Shesheke. From Ngoma, the line would traverse Northwest Botswana, connect with the proposed Mosetse – Kazungula line and ultimately connect with Kazungula Bridge (and eventually, Livingstone, Zambia).

As expected, both the financial returns of the TZR and economic returns to Namibia are much higher under a case where the Trans-Zambezi is further extended into Zambia or Botswana relative to confining the project to within the country's borders

The Consultant has offered its expertise and services as an extension of the present mandate for such study.

Traffic Certainty

Traffic certainty drives the viability of a railway project and synchronizing the TZR with neighbouring railway developments will enhance this certainty. In-turn, this will feed back to the financing potential and 'tenderability' of the TZR's development and operations.

Additionally, Zambia and Botswana recently completed the Kazungula Bridge and have formed a national partnership towards connecting the two countries by rail through this bridge. Namibia must become part of this partnership. The

proposed TZR will see its full potential if it is co-developed with Zambia and Botswana and their ongoing joint railway developments.

Immediate next steps would include forming a tri-patriate agreement with Zambia and Botswana so that all three countries' railway developments are synchronized and so that there is a uniform inter-operability framework and operational procedures.

The Consultant has offered its expertise and services to study the potential regional connectivity through Botswana as an extension of the present mandate for such studies.

7.3 Immediate Project Activities following this Study and the Study Extension

Implementing large infrastructure projects is a complex activity with many actors and activities contributing to successfully realizing these projects. This is particularly true for (Greenfield) railway projects, such as the proposed TZR.

Railway development requires the integration of *horizontal* elements such as truck, bridges and roadways and *vertical* elements such as stations, yards, and maintenance facilities necessitates a comprehensive set of design and construction services not typically found in other large projects.

Given the complexity of implementing large scale railway infrastructure projects, a rubust project plan at the initial stages becomes a requirement for successful implementation. And indeed, with the MoWT currently carrying out a feasibility study for the TZR, this requirement is alread being addressed by the Client.

7.3.1 Front-end Planning

Robust "Front-end Planning" involves meticulously planning the development of the TZR and Figure 7-1 summarizes key activities that are required by stage (project development, implementation and capacity building) for successful implementation.

Figure 7-1: Overarching Project Planning Activities by Stage

Project Development		Implementation – Financing, Construction and Procurement				Capacity Building
Project Development	**Inter country network**	**Financing for Construction**	**Private Operator**	**Procurement for Implementation**	**Testing & Commissioning**	**MoWT/ TransNamib**
Feasibility Study	Agreement with Zambia / Botswana	Selection of financing model – Multilateral, Bilateral, EPC+F	Developing PPP framework and contract agreement	Packaging of contracts – Civil, Track, S&T	Confirm infrastructure is safe and fit for use	Capacity Building – Trainings etc.
ESIA Studies	Developing inter operability framework & ops SOPs	Selection of specific financing	Define minimum performance standards	Design (FEED) and Preparation of Tender documents	Infrastructure and equipment integration	Reorient towards network mgmt and regulatory oversight
Preparation of Detailed Project Report including designs		Cross-Subsidization studies (e.g., developing SEZs)	Select and Onboard Operator	Selection of Contractors	Rollingstock to meet performance standards	Integration of marine and surface transport

Front-end Planning is critical and includes uncovering project uknowns and uncertainties (and how to address them) as the project is developed and implemented. This allows the Client to develop a structured approach to project execution and to make informed decisions on how best to allocate its resources during execution.

Practically, Front-end Planning also affords the Client to identify and mitigate issues such as right-of-way concerns, utility adjustments, environmental hazards, permitting requirements, etc.

In addition, Front-end Planning should be used to poll all major project stakeholders as to their assessment of the completeness of the process and to address their concerns in order to ensure 'stakeholder buy-in' to the project.

The overarching benefits of Front-end Planning are as follows:

1. Reduce design and construction costs
2. Improve cost and schedule predictability
3. Increase the likelihood of meeting the owner's (in this case, GoG) goals of the project

As per Figure 7-1, the MoWT is currently in the 'feasibility' stage in the Front-end Planning process. Activities following feasibility are discussed below and assume that the Client has taken a decision to move forward with the project into the next stage.

Please note that some of the activities or 'next steps' below are based on the findings from the Vol. I Report (Preliminary Design Report). Those activities are also placed here though for further context of these activities, Vol I. should be read.

7.3.2 Detailed Environmental and Social Impact Assessment

Section 5 of Vol II. describes, in detail, the next steps required towards completing the full Environmental and Social Impact assessment in compliance with:

1. Local environmental management legislation (Environmental Management Act (2007) and Regulations (2012)).

2. International lending requirements for environmental assessment (IFC – Performance Standards for Environmental and Social Sustainability/World Bank Group – Environmental and Social Standards (ESS)).

The TZR traverses both culturally and environmentally sensitive areas and to ensure their preservation, control measures need to be spelt out and made mandatory for the contractor and the operation and maintenance team to ensure the project brings mostly benefits to Namibia and does not bring the affected society and its environment into an environmental deficit.

Therefore, an immediate next step is to also start conducting the full environmental and social impacassessment and to acquire the necessary approvals from the local environmental authority.

7.3.3 Selecting the Financing Model and Securing Funding Sources

The magnitude of investments are detailed Section 13 of Vol I. Prelimnary Design Report with an overall project size of about US$2.26 billion. This is in addition to the possible expenditures required to complete upgrading the line between Walvis Bay and Grootfontein.

Furthermore, as discussed in Section 3 of this report, the most suitable structure involves the government developing the TZR and providing it to a private operator (or operators) under a concession/open access regime. In other words, investments in railway infrastructure would rest with the government.

As such, selecting the financing model and securing funding sources should commence immediately after the feasibility stage is complete with possible funding sources including multi-lateral loans and grants, bilateral (country-to-country) loans and internal funding (government bursury).

Secondary funding sources should also be studied as a means for cross-subsidizing the line's development and operations. For example, Special Economic Zones could be developed at strategic locations under a Landlord model whereby the State leases land to private developers.

Private developers would responsible for developing the land into an economic zone for industrial activities such as agricultural processing, refining copper, or other key strategic activities for Namibia. In term, land lease payments to the State could be used to cross-subsidize the TZR.

7.3.4 Open Access

The 2018 Namibia Transport Policy initiates the concept of 'open access' with respect to rail operations in Namibia and Section 3 of this report confirms that the TZR be structured under an open access regime where the state provides the railway infrastructure and a private operator (or operators) provide railway operations and maintenance services. Practically, open access needs to also apply to the current network so that there are fluid rail operations beyond Grootfontein.

Open access would require amending the National Transport Services Holding Company Act, 1998 and putting into effect, new legislation. Provisions for detailed anti-competitive measures on rail operators will be required (e.g., a licensing system, operating and safety regulations and accident investigations which can be housed with TransNamib as discussed above).

As required, the Competition Act would also have to be amended to ensure there is greater detail and clarity on anti-competitive issues specific to the rail sector. The skillset of the Competition Commission may also have to be enhanced to meet the related specific requirements of Namibia's rail sector.

The Consultant virtually attended the Southern African Rail Association's (SARA) annual conference, and it was noted that there was a push for 'open access' in rail operation. Different forms of open access have transpired, with the standard definition not just limited to train operations but also subletting rolling stock to operators.

From the Zambia field mission, it was also learned that even TAZARA has opened its line to open access operators, creating competition on its own line. One aspect that transpired is on what basis are open access operators charged for using the rail infrastructure. It seems that there is scope to develop a harmonised pricing policy.

7.3.5 Develop PPP Framework and Procure a Private Operator (or Operators)

Shifting over to an open access regime where private operators are engaged to provide railway operations will require developing a PPP framework for procuring a private operator (or operators).

We recommend that a Transaction Advisor is engaged to work with MoWT on these activities. The overall objective of a transaction advisor would be to:

1. Develop the PPP framework for engaging a private operator and on this basis:

    A. Define minimum performance standards and develop tender documents

    B. Prepare the concession/open access agreement defining the government's and private operator's role and responsibilities

    C. Oversee the tender administration and advise MoWT on related matters

    D. Evaluate tender submissions including bidders' proposed specifications for rolling stock

    E. negotiate with the preferred bidder

The above activities should be conducted in accordance with Namibia's PPP Act. Ideally, the operator should also be procured before construction contracts are tendered as input from the operator will be critical on technical specifications will be critical.

7.3.6 Project Packaging and Detailed Design - Front-End Engineering (FEED)

Following feasibility, we recommend that the Client package the construction based on its core components (track, civil and structures, and signal & telecommunications) and to accordingly prepare Detailed Designs till the stage of Front-end Engineering for the same.

The focus of FEED should be to:

1. Environmental Impact Assessment
2. Field surveys, investigations and detailed alignment designs.
3. Provide detailed bill of quantities and cost estimates (a key reference point for the tendering stage).
4. Technical specifications
5. Detailed construction execution schedule

FEED should also be required for upgrading the current Walvis Bay – Grootfontein section where required.

The specifications, bill of quantities and cost estimates for FEED vary between +-15% and provide a sound basis for tendering as follows:

A. Removes uncertainty in bidders' financial proposals thereby removing 'risk pricing' (i.e., overpricing due to unknowns).

B. Allows for bids to be compared during evaluations giving greater confidence in final bid selection.

C. Provides a more authentic and accurate 'reference price' or 'shadow bid price' giving the Client leverage to negotiate better pricing when finalizing the contract.

In our experience, EPC or Item Rate contracts can also be tendered but issues such as non-comparable bids and cost overruns can arise. Putting resources towards FEED now can save multiples of the original FEED cost as the project progresses to construction.

7.3.7 Prepare Tender Documents and Select Contractors

With FEED complete, the next step would be to prepare tender documents for the various construction packages towards selecting contractors to construct the TZR.

7.3.8 Capacity Development

Constructing the proposed TZR offers the government/MoWT a unique opportunity to build its knowledge and skillset in effectively procuring and managing such infrastructure. Such examples of areas for potential capacity building include:

1. Railway safety and regulations
2. Infrastructure project appraisal, planning and management (from a public sector lens)
3. Railway infrastructure and rolling stock technical specification scoping, review and tendering
4. International Federation of Consulting Engineers (FIDIC) contracting management and supervision
5. Climate risk and infrastructure vulnerability
6. Railway infrastructure and rollingstock maintenance planning and oversight

As part of the Front-end Planning and as a means to ensure that the MoWT is effectively armed with the necessary tools to procure and manage such a large infrastructure project, we suggest that a 'capacity needs assessment' be conducted specific to railway development and to procure technical assistance towards fulfilling and capacity needs. We note that in recent times, other African countries such as Uganda have conducted such activities in order to enhance their ability to procure and manage railways.

7.3.9 Levelling Namibia's Land Transport Playing Field

Freight in Namibia predominantly moves by road. Some of the reasons for this can be attributed to a general dissatisfaction with rail services however, road transport pricing also plays a role. A

key finding of this assignment is that the playing field between road and rail transport needs to be levelled in Namibia so that where it makes economic sense (e.g., over long distances), freight is shifted from road to rail.

The 2018 Namibian Transport Policy concisely states:

In promoting intermodalism the Government intends to level playing fields and eliminate constraints or disincentives resulting in inefficiencies, including the use of inappropriate modes. A key driver of reducing costs of transport is capacity utilisation. As such, a goal of infrastructure and modal planning will be to optimise capacity utilisation and to achieve a level of integration between modes.

The pricing dynamics and service levels between road and rail transport need to be studied in detail and where required, reforms should ensure a level playing field. As purported in the Transport Policy, reforms should rebalance total surface transport capacity towards rail and promote the integration of rail and road transport (as opposed to these two modes competing).

Namibia's Competition Commission enforces the Competition Act and has a role in leveling the playing field. As required, the Commission should be staffed with the necessary expertise not only to maintain a level playing field but to also ensure that open rail access is operated in a competitive environment (discussed below).

The policy also identifies 'Customer and Public Satisfaction' as a key performance indicator when monitoring and evaluating the performance of the policy's implementation. Given the current sentiments of rail, monitoring satisfaction – especially in an open access regime – is critical.

7.3.10 Defining TransNamib's Role

Section 6 of this report has identified certain legal shortcomings of TransNamib's functions, namely the self-regulating nature of the entity[31]. In addition, research and consultations for this assignment have also highlighted the operating and commercial-oriented shortcomings of TransNamib.

As the country moves towards commercially oriented railway operations with private sector participation, there are certainly opportunities to refocus TransNamib's role in Namibia's rail sector.

TransNamib

TransNamib is housed with Namibia's railway heritage and institutional memory and on this basis alone, there is a real opportunity to redefine TransNamib's role in Namibia's railway development and operations.

For example, while operations may be completely migrated to the private sector, TransNamib can be redefined as a Railway Authority charged with addressing operator licensing, open access and safety regulations and accident investigations. TransNamib can also oversee the 'Transport Investment Fund' as discussed in Section 3 of Vol II.

[31] See 2018 Namibia Transport Policy

As the Railway Authority, TransNamib should be completely independent from rail infrastructure ownership and operations. Furthermore, its financial sustainability should not be tied to licensing fees to remove any 'conflict of interest' between railway operations and regulations.

7.3.11 Full View of the Logistics Chain (from Vol. II)

The proposed TZR is only one 'hard initiative' in improving Namibia's overall logistics chains towards becoming a premier logistics hub. The interface between land and maritime transport also needs to be considered. Specifically, the infrastructure and services at the Port of Walvis Bay need to be positioned to meet the traffic handled by the TZR.

In other words, the cost effectiveness of ports play an important role in choosing export route options. Logistics companies look holistically, and it is not beneficial if the TZR results in significant benefits to companies while port costs and delays completely negates these benefits.

To this end, we understand that Namport is developing a ports masterplan. This masterplan should consider the infrastructure and/or service requirements that may be required now and, in the future, to handle the traffic generated by the TZR.

7.4 Implementation Schedule

It is the Consultant's view that the TZR can be developed and made operational by the first quarter of 2027. Figure 7-2 provides an 'implementation schedule' for the activities mentioned in the previous section through to construction completion.

Figure 7-2: Project Implementation Schedule

Activity #	Implementation Activity	Responsibility	Duration (Months)	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	Aug-23	Feb-24	Aug-24	Feb-25	Aug-25	Feb-26	Aug-26	Mar-27
				Pre-Construction Period												Construction Period									
1	Resolve Interoperability Issues between the TZR and the existing Walvis Bay Section	MoWT	3																						
2	Resolve pricing dynamics and other issues between rail and road transport removing any advantages to road	MoWT, Competition Commission	5																						
3	Implement Tri-Patriate Railway Development Agreement with Zambia and Botswana	Governments of Namibia, Zambia and Botswana	7																						
4	Restructure TransNamib as a railway authority charged with operator licensing, open access and safety regulations and accident investigations	MoWT, TransNamib	8																						
5	Amend legislation to allow for open access to private rail operators	MoWT, Cabinet, Parliament, Attorney General	12																						
6	Prepare the environmental and social impact assessment and conclude land acquisition/resettlement	MoWT	10																						
7	Prepare FEED for TZR (and existing sections where required)	MoWT	7																						
8	Secure funding for the TZR	MoWT, MoF, Transport Advisory Board	12																						
9	Procure Contractor to Construct the TZR	MoWT	12																						
10	Procure a Private Operator (or Operators)	MoWT / MoF	12																						
11	Construct the TZR	MoWT/Contractor	48																						
12	MoWT Capacity Development	MoWT	Throughout and designed at specific milestone points																						
13	Integrate TZR traffic into NamPort's future port expansion plans	MoWT / NamPort	Throughout TZR (pre)construction and operations																						

8 Appendix A – Traffic Forecast by Scenario

Table 8-1: Scenario One Traffic Forecast (in Tons)

S. NO.	Year	From Grootfontein to Katima Mulilo	From Katima Mulilo to Grootfontein
1	2027	680,316	714,771
2	2031	2,617,763	2,664,835
3	2041	3,875,164	3,672,685
4	2051	5,751,690	5,032,397
5	2061	8,588,683	6,784,596
6	2066	10,543,123	7,925,757
7	2069	11,939,011	8,715,939

S. NO.	Year	From Grootfontein to Rundu	From Divundu to Grootfontein
1	2027	8	1,360
2	2031	32	4,971
3	2041	47	6,271
4	2051	70	7,921
5	2061	103	10,033
6	2066	126	11,389
7	2069	141	12,323

Table 8-2: Scenario Two Traffic Forecast (in Tons)

S. NO.	Year	From Grootfontein to Katima Mulilo	From Katima Mulilo to Grootfontein
1	2027	1,475,231	1,264,559
2	2031	5,686,409	4,757,788
3	2041	8,475,296	6,741,155
4	2051	12,668,279	9,441,079
5	2061	19,044,518	12,937,134
6	2066	23,446,332	15,226,769
7	2069	26,593,289	16,816,490

S. NO.	Year	From Grootfontein to Rundu	From Divundu to Grootfontein
1	2027	8	1,360
2	2031	32	4,971
3	2041	47	6,271
4	2051	70	7,921
5	2061	103	10,033

S. NO.	Year	From Grootfontein to Rundu	From Divundu to Grootfontein
6	2066	126	11,389
7	2069	141	12,323

Table 8-3: Scenario Three Traffic Forecast (in Tons)

S. NO.	Year	From Grootfontein to Katima Mulilo	From Katima Mulilo to Grootfontein
1	2027	1,270,684	1,179,831
2	2031	4,895,575	4,417,265
3	2041	7,285,459	6,172,471
4	2051	10,873,496	8,552,491
5	2061	16,323,150	11,628,199
6	2066	20,083,165	13,636,389
7	2069	22,770,502	15,028,594

S. NO.	Year	From Grootfontein to Rundu	From Divundu to Grootfontein
1	2027	8	1,360
2	2031	32	4,971
3	2041	47	6,271
4	2051	70	7,921
5	2061	103	10,033
6	2066	126	11,389
7	2069	141	12,323