P: MAL/059.06W
PN-ABT-797

TECHNICAL WORKING PAPER

Preliminary Draft

VALUATION OF RAILWAY ASSETS

Prepared in support of:

The Malawi Railway Restructuring Project

Prepared by:

Abt Associates, Inc.

Funded by:

USAID/SARP/Zimbabwe

Funded via:

The Privatization and Development Project
(Prime Contractor: Price Waterhouse)

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Valuation of Railway Assets

Malawi Railway Restructuring Project

Introduction

Malawi Railways Ltd (MR) is in the process of implementing a major restructuring program in order to improve efficiency and enable it to move towards a fully commercial operation. To support the project design and appraisal of a new organization, the Government of Malawi and MR have sought financial and technical assistance from a multi-donor group led by the World Bank.

In support of this initiative, a Consultant Team fielded by Abt Associates, Inc. was asked to undertake a number of analytical studies which took place in June and July 1994. One of these was to make an evaluation of the assets of the present Malawi Railways Ltd, indicate which assets should be transferred to New Malawi Railways (NMR), and estimate those asset's financial value.

Scope of Work

This document reviews the assets recorded by the present MR company, particularly with regard to its rolling stock, and evaluates those which might be transferred to the new company in due course.

Methodology

In order to prepare this report Ron Puntis, a Chartered Engineer and expert in the field of railway maintenance and operation, spent 8 days in Blantyre talking to officials of MR, inspecting their records, facilities and vehicles to form an opinion of their current status. This was followed by a period in the UK assessing the information, gathering further financial data, and preparing this analysis.

Evaluation has been on a depreciated replacement cost (DRC) basis, but where possible the net book value (NBV) according to MR records has been included and also an assessment of the present market value (MV).

The report is presented in the form of a discussion and evaluation of the present MR Ltd. assets and a considered view of those required, particularly wagons, following restructuring. It is

supported by tables detailing assets and values based on information gathered during the field trip. The remainder of this report reviews each major asset type, in sequence.

Locomotives - Main line

The company currently has a fleet of 31 locomotives in the general range of 1400 horse power, as detailed in Table 1. Three of these are on hire from Zambia. The most modern and the only ones considered suitable for the new MR are amongst the 19 purchased from MLW/Bombadier in 1973 (4) and 1980 (15).

Although the most modern in the fleet, these latter locomotives are subject to an ongoing refurbishment program through a USAID project. This is the result of a number of technical problems occurring since delivery and has led to a reduced performance from the machines. The main areas identified for attention are:

1. Turbo chargers
2. Cylinder liners
3. Electrical wiring in the control cubicle

So far 6 have been completed with the seventh in progress but waiting the supply of the necessary spares. Indications are that the work is proving satisfactory and as a result the engines have been uplifted from a temporary power rates of 1000hp to their intended output of 1400hp.

A review of the recorded costs for the locomotive refurbishment project indicates that the current average cost is in the order of K750,000 per vehicle. It is important that this work continues to completion on all the currently financed 12 locomotives, thereby ensuring that haulage capacity for the projected traffic flows between Malawi and the Port of Nacala in Mozambique can be met.

MR are already looking to the future and a number of locomotives have been set aside in order to reduce costs. The Chief Mechanical Engineer's current target is to provide the traffic department with 10 MLW locomotives for operation every day out of a notional fleet of 12. Whilst this is a realistic target, one additional locomotive could be retained during the refurbishment program in order to cover for lost availability.

However, as part of the restructuring, it is essential to review the current methods of measuring availability to reflect more accurately the business requirements. The preferred approach would be to record each day the number of trains required to be run. This would enable a regular review and analysis of the Mechanical department's performance to take place, provide a firm basis on which to plan any corrective action and enable expenditure on modifications to be properly evaluated.

Table 1

MALAWI RAILWAYS

MAINLINE LOCOMOTIVES

All locomotives have a Co–Co wheel arrangement
and electric transmission

Fleet No.	Builder	Date	Refurb	New MR	NBV	DRC	MV
400	AEI	1963			22k	1.8m	Scrap?
401	AEI	1963			22k	1.8m	Scrap?
402	AEI	1963			22k	1.8m	Scrap?
403	AEI	1963			22k	1.8m	Scrap?
404	AEI	1968			33k	2.8m	Scrap?
406	AEI	1968			33k	2.8m	Scrap?
407	AEI	1968			33k	2.8m	Scrap?
408	AEI	1968			33k	2.8m	Scrap?
409	AEI	1968			33k	2.8m	Scrap?
Total = 9							
500	MLW/BOM	1973			89k	3.8m	
501	MLW/BOM	1973			89k	3.8m	
502	MLW/BOM	1973			89k	3.8m	
503	MLW/BOM	1973			89k	3.8m	
504	MLW/BOM	1980		Y	137k	7.6m	8m
505	MLW/BOM	1980	Y	Y	137k	7.6m	
506	MLW/BOM	1980		Y	137k	7.6m	
507	MLW/BOM	1980		Y	137k	7.6m	
508	MLW/BOM	1980			137k	7.6m	
509	MLW/BOM	1980	Y	Y	137k	7.6m	8m
510	MLW/BOM	1980	Y	Y	137k	7.6m	8m
511	MLW/BOM	1980		Y	137k	7.6m	
512	MLW/BOM	1980	In prog	Y	137k	7.6m	8m
513	MLW/BOM	1980			137k	7.6m	
515	MLW/BOM	1980		Y	137k	7.6m	
516	MLW/BOM	1980	Y	Y	137k	7.6m	8m
517	MLW/BOM	1980	Y	Y	137k	7.6m	8m
518	MLW/BOM	1980		Y	137k	7.6m	
519	MLW/BOM	1980	Y	Y	137k	7.6m	8m
Total = 19							

Current fleet = 28 + 3 hired from Zambia = 31

NBV	K	2.5m
DRC	K	150.5m

Proposed fleet (including one for refurb programme) = 13

NBV	K	1.7k
DRC	K	98.8m

Key:		
	AEI	built in UK
	MLW/BOM	built in Canada

In terms of net book value, locomotives have been depreciated on a "straight line" basis of 50% of original cost at 2.5%, and 50% at 5% to distinguish between the differing life expectations of the Body and Engine. The life of the body is thus reckoned at 40 years and the engine at 20 years.

In seeking to evaluate a current replacement cost for these vehicles, a review of world prices would suggest that suitable locomotives could be obtained for around K16m each (US$2.2m). It should be born in mind that new locomotives would be expected to have superior performance with the result that it may be possible to reduce the fleet.

With regard to market value, many of the older locomotives are unlikely to find a buyer other than for scrap (say K10k each) unless a considerable amount is spent on general refurbishment and updating of equipment, such as control gear, to modern standards.

However, the MLW/Bombadier locomotives may well find use elsewhere, particularly those which have been refurbished. Those not required by the new MR could be done as a continuation of the existing program or by an independent agency. It is estimated that these could command a market value of around 50% of the price of a new vehicle.

Locomotives - Shunters

MR has assembled over the years a number of shunting locomotives, some of which could operate local trip workings (switchers) to provide local needs.

More recently 5 locomotives were provided by the Belgian government which unfortunately have proved not to be entirely satisfactory to MR. The problems are reported to be excessive exhaust emissions and fuel dilution of the engine lubricating oil.

For the future MR have identified the need for seven locomotives for local duties which are detailed in Table 2.

The Belgian locomotives are not part of this plan and their future use would have to be agreed with the donor in the light of the present funding arrangements.

As with the main line locomotives, the book value is depreciated at 2.5% p.a. for 50% of the original value and 5% p.a. for the remainder.

Based on the known cost of the Belgian locomotives the replacement value for a typical shunting/trip locomotive is put at around K9m (US$1.2m).

The age of the remaining shunter locomotive fleet is such that it is unlikely to have any future use and would be disposed of at scrap value.

Table 2

MALAWI RAILWAYS

SHUNTING LOCOMOTIVES

All locomotives have hydraulic transmission

Fleet No.	Builder	Date	W/A	New MR	NBV	DRC
100	RSH	1962	0–6–0		3.5k	0.9m
101	RSH	1962	0–6–0		3.5k	0.9m
105	A/B	1967	0–6–0		7.2k	1.5m
106	A/B	1967	0–6–0		7.2k	1.5m
110	HUN	1974	0–6–0		36.2k	2.3m
111	HUN	1975	0–6–0	Y	36.2k	2.4m
112	HUN	1976	0–6–0	Y	36.2k	2.5m
113	HUN	1976	0–6–0	Y	36.2k	2.5m
201	BEL	1993	0–6–0		3.7m	6.5m
202	BEL	1993	0–6–0		3.7m	6.5m
203	BEL	1993	0–6–0		3.7m	6.5m
204	BEL	1993	0–6–0		3.7m	6.5m
205	BEL	1993	0–6–0		3.7m	6.5m
301	N/S	1967	B–B	Y	9.3k	1.6m
302	N/S	1967	B–B	Y	9.3k	1.6m
303	HUN	1968	B–B		13.2k	1.6m
304	HUN	1968	B–B		13.2k	1.6m
305	HUN	1968	B–B		13.5k	1.6m
306	HUN	1968	B–B		13.5k	1.6m
307	HUN	1968	B–B		13.5k	1.6m
308	HUN	1968	B–B		13.5k	1.6m
309	HUN	1968	B–B		13.5k	1.6m
310	N/S	1972	B–B	Y	24.8k	2.0m
311	N/S	1972	B–B	Y	24.8k	2.0m

Current fleet = 24	NBV	K 330k (+Belgian locos K 18m)	DRC	K 33m (+Belgian locos K 32.5m)
Proposed flee = 7	NBV	K 177k	DRC	K 14.6m

Key: RSH = Robert Stephenson & Hawthorn
A/B = Andrew Barclay
N/S = Nippon Sharyo
BEL = Cockerill Mechanical Industries

W/A = wheel arrangement

Wagons

The declared intention is to retain only those vehicles on roller bearings. This is an important decision which should free the railroad from unnecessary derailments and consequent costs of recovery and compensation.

Provision is made within the investment budget for the conversion of a further 100 vehicles to roller bearings. Final decision on this expenditure should await confirmation of traffic forecasts and the commitment to reduce wagon turnaround times.

It must be realized that wagon turnaround times are essential to the profitability of the new company and improvements of at least 50% will avoid unnecessary future expenditure. This is illustrated in Tables 3-6, where the required fleet sizes to meet traffic demands are set out.

In terms of fleet size estimates are made on the basis of :

1. World Bank BASE forecast 1994/95, present wagon turnaround times

2. World Bank BASE forecast 1994/95, wagon turnaround times improved by 50%

3. World Bank BASE forecast 1999/2000, wagon turnaround times improved by 50%

4. World Bank RESTRUCTURING forecast 1999/2000, wagon turnaround times improved by 50%

Table 7 summarizes the current situation with regard to numbers and age of the wagon fleet.

Information from the records of MR would suggest that many of the wagons are seriously overdue routine maintenance.

MR has depreciated its vehicles at 2.5% p.a. (a 40 year life.)

Approximately 50% of the current fleet is over 40 years old, the majority of which is on brass (non roller bearings) axles which, because of their inherent maintenance characteristics, constitute a major safety hazard running over long distances without inspection.

The policy of retaining only roller bearing fitted vehicles for the new Malawi Railways is therefore endorsed.

MR made enquiries for new wagons 1989/90 and an indicative replacement cost at today's prices is in the order of K5m (US$79k) per vehicle.

Table 3

MALAWI RAILWAYS

PROJECTED WAGON REQUIREMENTS

Assumptions:
Traffic forecast BASE 1994/95
Wagon turnround times as now
Wagon availability 70%
50% of import/export traffic is carried in CFM (Mozambique) wagons which are loaded in each direction

Commodity	Annual Tonnage	Months of Activity	Ave Wagon Load	Ave Turn Round	Wagons Required CB/P	HSB	LSB	EU	FT
DOMESTIC									
Cement	2260	12	35	8	2				
Clinker	111920	12	45	4		39			
Coal	16920	12	40	4		7			
Cotton Lint	1850	8	13	8	3	3			
Cotton seed	1970	8	25	8	2	2			
Cotton ungin	2590	6	15	8	5	5			
Fertiliser	4010	6	35	8	7				
Maize	11310	6	35	8	21				
Tobacco	18430	6	12	10	91	30			
Empty Cont	2180	8	4	8			13	13	
Other	21370	8	12	8	64	21			
Fuel	15120	12	36	12					20
					196	109	13	13	20
EXPORTS									
Tobacco	23000	8	18	18			68	68	
Other	6000	12	18	15	20				
					20	0	68	68	0
IMPORTS									
Fertiliser	24000	12	30	18			29	29	
Dry cargoes	52000	12	30	15			52	52	
Fuel	25000	12	36	15					41
Oils	14000	12	36	15				23	
					0	0	80	103	41
Total wagon requirement*					206	109	53	65	41
Present roller bearing fleet					127	86	77	60	50

Total = 472
Total = 400

(* see assumptions above)

Table 4

MALAWI RAILWAYS

PROJECTED WAGON REQUIREMENTS

Assumptions: Traffic forecast BASE 1994/95
Wagon turnround times reduced by 50%
Wagon availability 70%
50% of import/export traffic is carried in CFM (Mozambique) wagons which are loaded in each direction

Commodity	Annual Tonnage	Months of Activity	Ave Wagon Load	Ave Turn Round	Wagons Required CB/P	HSB	LSB	EU	FT
DOMESTIC									
Cement	2260	12	35	4	1				
Clinker	111920	12	45	2		20			
Coal	16920	12	40	2		3			
Cotton Lint	1850	8	13	4	2	2			
Cotton seed	1970	8	25	4	1	1			
Cotton ungin	2590	6	15	4	3	3			
Fertiliser	4010	6	35	4	4				
Maize	11310	6	35	4	10				
Tobacco	18430	6	12	5	46	15			
Empty Cont	2180	8	4	4			6	6	
Other	21370	8	12	4	32	11			
Fuel	15120	12	36	6					10
					98	54	6	6	10
EXPORTS									
Tobacco	23000	8	18	9			34	34	
Other	6000	12	18	8	11				
					11	0	34	34	0
IMPORTS									
Fertiliser	24000	12	30	9			14	14	
Dry cargoes	52000	12	30	8			28	28	
Fuel	25000	12	36	8					22
Oils	14000	12	36	8				12	
					0	0	42	54	22
Total wagon requirement*					103	54	27	34	21
Present roller bearing fleet					127	86	77	60	50

(* see assumptions above)

Table 5

MALAWI RAILWAYS

PROJECTED WAGON REQUIREMENTS

Assumptions: Traffic forecast BASE 1999/2000
Wagon turnround times reduced by 50%
Wagon availability 70%
50% of import/export traffic is carried in CFM (Mozambique) wagons which are loaded in each direction

Commodity	Annual Tonnage	Months of Activity	Ave Wagon Load	Ave Turn Round	Wagons Required CB/P	HSB	LSB	EU	FT
DOMESTIC									
Cement	2260	12	35	4	1				
Clinker	111920	12	45	2		20			
Coal	16920	12	40	2		3			
Cotton Lint	1850	8	13	4	2	2			
Cotton seed	1970	8	25	4	1	1			
Cotton ungin	2590	6	15	4	3	3			
Fertiliser	4010	6	35	4	4				
Maize	11310	6	35	4	10				
Tobacco	18430	6	12	5	46	15			
Empty Cont	2180	8	4	4			6	6	
Other	21370	8	12	4	32	11			
Fuel	15120	12	36	6					10
					98	54	6	6	10
EXPORTS									
Tobacco	40500	8	18	9			60	60	
Other	13000	12	18	8	23				
					23	0	60	60	0
IMPORTS									
Fertiliser	44000	12	30	9			26	26	
Dry cargoes	66500	12	30	8			35	35	
Fuel	58000	12	36	8					51
Oils	16000	12	36	8				14	
					0	0	61	75	51
Total wagon requirement*					109	54	37	44	36
Present roller bearing fleet					127	86	77	60	50

(* see assumptions above)

Table 6

MALAWI RAILWAYS

PROJECTED WAGON REQUIREMENTS

Assumptions: Trafic forecast RESTRUCTURING 1999/2000
Wagon turnround times reduced by 50%
Wagon availability 70%
50% of import/export traffic is carried in CFM (Mozambique) wagons which are loaded in each direction

Commodity	Annual Tonnage	Months of Activity	Ave Wagon Load	Ave Turn Round	Wagons Required CB/P	HSB	LSB	EU	FT
DOMESTIC									
Cement	2260	12	35	4	1				
Clinker	111920	12	45	2		20			
Coal	16920	12	10	2		3			
Cotton Lint	1850	8	13	4	2	2			
Cotton seed	1970	8	25	4	1	1			
Cotton ungin	2590	6	15	4	3	3			
Fertiliser	4010	6	35	4	4				
Maize	11310	6	35	4	10				
Tobacco	18430	6	12	5	46	15			
Empty Cont	2180	8	4	4			6	6	
Other	21370	8	12	4	32	11			
Fuel	15120	12	36	6					10
					98	54	6	6	10
EXPORTS									
Tobacco	51100	8	18	9			76	76	
Other	16400	12	18	8	29				
					29	0	76	76	0
IMPORTS									
Fertiliser	55500	12	30	9			33	33	
Dry cargoes	83800	12	30	8			44	44	
Fuel	73000	12	36	8					64
Oils	20200	12	36	8				18	
					0	0	77	95	64
Total wagon requirement*					112	54	45	54	42
Present roller bearing fleet					127	86	77	60	50

(* see assumptions above)

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Table 7

MALAWI RAILWAYS

WAGON FLEET PROFILE

Wagon Type	> CB+P		HSB		LSB		UE		FT		DRC
Brg Type	> R	B	R	B	R	B	R	B	R	B	Km
Age Years											
10–14									6		19
15–19				7			58		21		215
20–24			85		9				15		204
25–29	123				58				4		207
30–34	2	21							1	3	17
35–39		5			9	33	1	60	3	12	47
40+	2	118	1	38	1	23	1	16		14	
	127	144	86	45	77	56	60	76	50	29	709

Wagon Type	Description	Commodities
CB & P	Covered bogie	Cement, fertiliser, maize, cotton, tobacco
HSB	High sided bogie	Clinker, coal, cotton, tobacco
LSB	Low sided bogie	Containers
UE	Container flat	Containers
FT	Tank car	Fuels and oils

Bearing types

R = Roller bearings fitted — 400 traffic vehicles
B = Brass (or plain) bearings fitted — 350 traffic vehicles

Buildings, Plant and Machinery

Quantifying the value of buildings and plant contained herein has not been possible in detail. There are two distinct groupings:

1. power supply and pumping machinery at each station

2. workshops associated with the maintenance of this equipment, vehicles and track.

So far as vehicles are concerned, the main center is now at Limbe with minimal fuelling and servicing facilities at Lilongwe and Salima.

Much of the engineering equipment at Limbe, life expired in many cases, is used daily to good effect utilizing the skills of the local workforce to overcome the shortages of spare parts and provide a service to local industry.

The buildings are considered as essential to the railway's operation and were excluded from the property evaluation exercise.

A check on the inventory of equipment reveals that many assets are already written off and it is suggested that an arbitrary value of 10% of the total represents a reasonable assessment of their value.

Track

The duration of the project gave no opportunity to visit or inspect the permanent way. The information given in Table 8 was provided by MR.

Service Vehicles

In addition to the revenue earning vehicle fleet, there is a need to retain a number of service vehicles to assist in the maintenance of the infrastructure. These consist primarily of inspection trollies and wagons to deliver track maintenance materials to site, plus a wrecking crane to deal with emergencies. The proposed requirements are detailed in Table 9.

Table 8

MALAWI RAILWAYS

TRACK INFRASTRUCTURE

	Border/Nsanje–Limbe		Limbe – Salima		Nayuci – Nkaya		Salima – Lilongwe		Lilongwe – Mchinji	
	km	yrs	km	yrs	km	yrs	km	yrs	km	yrs
RAILS										
30.0kg	200	40	100	40						
37.5kg			85	20						
40.0kg			84	15	100	25	112	15	115	10
SLEEPERS										
Wood	25	20	16	20						
Steel	160	40	168	40						
Concrete	15	10	85	10	100	25	112	15	115	10
BALLAST										
Full stone	60	20	90		100	25	85	15		
Part stone	125	20	179				27	15	115	10
Gravel	15	85								

Estimated replacement costs / km:

Rails	K 210k
Sleepers	K 333k
Ballast	K 160k

Say K 705k per track kilometer

Table 9

MALAWI RAILWAYS

SERVICE VEHICLE REQUIREMENTS

Wagons			Av Age yrs	NBV	DRC
	RB	12	15		60m
	BB	25	40		50m
Civil Engineering Trollies					
	LIT	2	10	|	
	HGT	11	11	| 1.2m	
Wrecking Cranes					
	100 tonne	1	3	4.8m	

Key:
RB = rail carrying bogie wagons
BB = ballast carrying bgie wagons
LIT = light inspection trolley
HGT = heavy gang trolley

APPENDIX A

References

MR Register of Locomotive Stock and Motor Trollies, 30 Sept 1993

MR Locomotive fleet for "Doomwatch," file note

MR Register of Rolling Stock, 30 July 1993

MR Wagon Requirement for 1994/1995 Traffic Projections

MR Wagon fleet for "Doomwatch," file note 14 April 1994

MR Wagon Strategy, letter 22 April 1994

MR Assets Register, Workship Machinery, Power and Water Plants

MR Track Valuation File Note, 15 April 1994

MR CCE's Department Wagon Requirement, letter 13 October 1993

MR Core Railway Capital Investment Plan

Malawi Railways Ltd Group Fixed Assets Summary for year ended 31 April 1994

Financial Analysis Working Paper, Draft: 29 May 1994, Abt Associates, Inc.

APPENDIX B

List of Contacts

The following people were of great assistance in providing the information on which this report is based:

F W Markham	General Manager
E Limbe	Deputy General Manager
H Thindwa	Asst. General Manager, Traffic
M Mlenga	Chief Traffic Manager
S Takomana	Chief Planning Manager
K Chenjerani	Chief Mechanical Engineer
H Chinwaza	Mechanical Engineer's department
J Mwanefumba	Mechanical Engineer's department
G Kavwenje	Chief Civil Engineer
M Ndenya	Financial Accountant