EXECUTIVE SUMMARY

A. PURPOSE OF THIS REPORT

This report presents the results of Operational analysis and detailing of operations for the corridor.

B. METHODOLOGY ADOPTED FOR THE STUDY

The operational planning of a modern railway system is a complex and sophisticated process, wherein with many aspects have to be considered. There is interdependency between infrastructure, rolling stock and the operational service design. The goal of this chapter is to prepare an **Operation Concept**, which is considered to be a frame for the later investigations, which contains a more detailed Operation Program. The Operation Concept concentrates on the dimensioning of the system and thus deals in first place with the relevant peak services (Refer **Figure 1**). It covers the following:

- Defining service runs during peak hours,
- Estimation of according Rolling Stock fleet,
- Operational requirements for line infrastructure

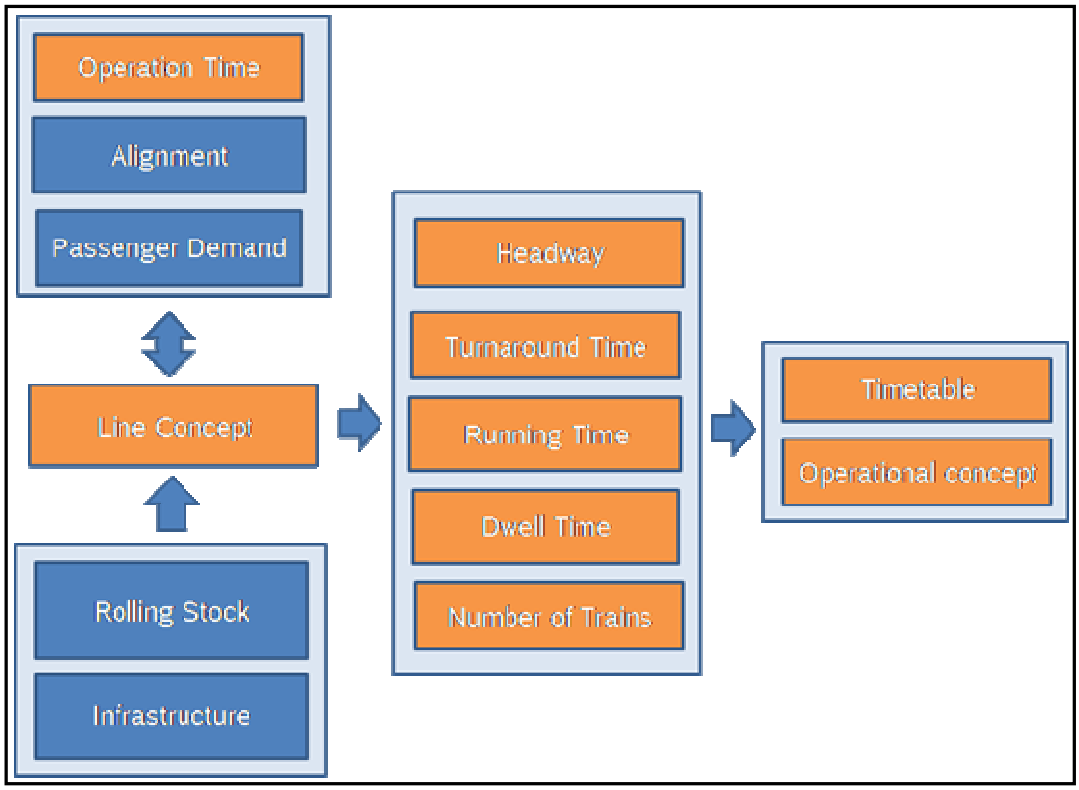

Figure 1: Methodology for Preparation of Operational Concept

C. DEFINITION OF IMPLEMENTATION PHASES AND RECOMMENDATIONS

C.1: Option Development

Corridor A: Polokwane –Mokopane Commuter Rail Service

This option (Corridor A) takes Polokwane to Mokopane as the core and adds 8 new stations in between, as depicted below on **Figure 2**.

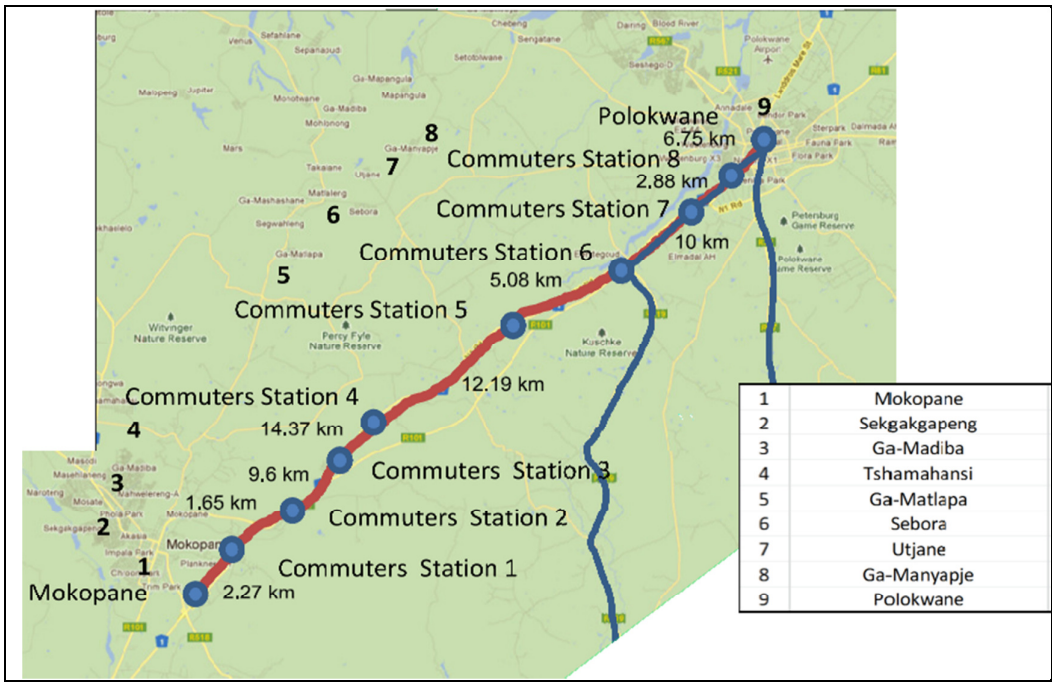

Figure 2: Corridor A – Polokwane to Mokopane

In operational terms, a wholly new line would be relatively simple to plan and operate, and should achieve excellent performance and reliability. If the existing classic line were to be adapted to provide commuter services alongside the current long-distance Shosholoza Meyl service, then there would be considerable operational constraints due to the technological performance characteristics of the classic line (including the one track nature of the line) as well as the complex mix of existing passenger and freight train on this route section. Classic line running also requires that new line rolling stock is compatible with the current classic line infrastructure. The market demand analysis found that in case on Polokwane –Mokopane , the morning peak hour trips towards Polokwane is 62734(2050).

Corridor D: Polokwane –Moloto Passenger Rail Corridor

This option (Corridor D) takes Polokwane to Jane Furse (via Zebediela) as the core and adds 15 stations in between as depicted below on **Figures 3** and **4**.

Figure 3: Corridor D – Polokwane to Lebowakgomo

Figure 4: Corridor D: Lebowakgomo to Jane Furse

1	Lebowakgomo
2	Mmakotse
3	Makhushaneg
5	Motsereng
4	Ga - Madisaleolo
6	Lenting
7	Marulaneng
8	Mamatonya
9	Ga - Phaswana
10	Byldrit
11	Grootklip
12	Malope
13	De Paarl
14	Mahlolaneng
15	Ga - Masemola
17	Sekale
24	Pitsaneng
25	Mashoanyaneng
26	Maraganeng
27	Lewalemolomo
28	Mosehla
29	Good Hope
30	Mgababa
31	Jane Furse
32	Sekhutlong
33	Sekwati
34	Ga-Tisane
35	Diphagane
36	Ga-Taine
37	Mohwelere
38	Ga-Mokalape
39	Ga - Chuene
40	Chuenespoort
41	Schuinsrand
42	Matome
43	Mathibela
44	Ga-Maja
45	Ga - Rakgoatha
46	Makweng
47	Moletlane
48	Mogoto
49	Zebediela
22	Mamaolo
20	Thamagane
19	Morotse

Similar considerations as recorded for Polokwane-Mokopane corridor were factored into the assessment of the Polokwane – Jane Furse line with regard to the track portion from Polokwane to the kilometre 267.8 turn-off, where the route is parallel to the classic line route between Polokwane and Mokopane. The intuitive advantages of utilizing the classic line were far outweighed by the negative operational disadvantages. If the existing classic line were to be adapted to provide commuter services alongside the current long-distance Shosholoza Meyl service, then there would be considerable operational constraints due to the technological performance characteristics of the classic line (including the one track nature of the line) as well as the complex mix of existing passenger and freight train on this route section. Classic line running also requires that new line rolling stock is compatible with the current classic line infrastructure.

In terms of construction, there are a few issues that strongly favoured the Polokwane Jane Furse via Zebediela ahead of via Chuenespoort. The alignment through Zebediela traverses through flatter terrain; hence there is no requirement of tunnels.

Equally, environmental considerations weighed decisively in favour of the via Zebediela option. The option via Chuenespoort traverses through area of high environmental sensitivity viz; Bewaarkloof Nature Reserve, Centres of Endemism, vulnerable and endangered eco-systems, heritage areas, whereas there are no such issues via the Zebediela option. Moreover, the option via Zebediela passes through land capable of arable culture and there will be fewer traffic accidents due to terrain conditions.

In case of Polokwane –Moloto Corridor, both the options viz. Option 1 via Chuneesport and Option 2 via were modelled. As the demand estimates are higher for the option via Zebediela, it is recommended for as the preferred linkage from demand side (82,438 morning peak hour trips towards Polokwane via Zebediela vis-a-vis 74872 morning peak hour trips towards Polokwane via Chunespoort) for the cardinal year 2050.
In terms of suitability and, although the principal objective of this study is to provide for passenger transport, the detail feasibility should include freight movement capacity along the corridors of the preferred options.

Recommendations: Corridor A: Polokwane –Mokopane Commuter Rail Service and Corridor D: Polokwane –Moloto Passenger Rail Corridor

The Moloto Corridor project was accepted by Cabinet to link Moloto in Mpumalanga to Tshwane with a standard gauge rail line. The corridor could be extended in future via Jane Furse to Burgersfort. The aim of the study is to identify the preferred linkage between Polokwane and Jane Furse. The options to be studied were 1) Polokwane –Chuenespoort-Lebowakgomo - Jane Furse 2) Polokwane - Zebediela – Lebowakgomo- Jane Furse.

Item	Option A (Chuenespoort)	Option B (Zebediela)
Route Overview	1)Passes through mountainous area	1)Topography is relatively flat with no requirement of long tunnels
	2)Major Settlements on the line: Polokwane, Drop, Plaas, , Ga-Rakgoatha, Mmakotse, Lebowakgomo, Lebowakgomo South, Maruleng , Ga-Masemola, Mashabela, Makadikwe, Ga-Marishane, Difapyae, Jane Furse	2)Major Settlements on the line: Polokwane, Plant, Ga-Tshwene, Lebowakgomo, Lebowakgomo South, Maruleng , Ga-Masemola, Mashabela, Makadikwe, Ga-Marishane, Difapyae, Jane Furse
Time Travel of passenger trains	31 minutes	48 minutes
Passenger Demand forecast (year 2050) high estimate	1947457 morning peak hour trips (Towards Polokwane)	2088477 morning peak hour trips (Towards Polokwane)
	152658 morning peak hour trips (Towards Jane Furse)	265037 morning peak hour trips (Towards Jane Furse)
Route Length	Approx 141 km	Approx 150 km
Social and environmental considerations	1) Traverses through area of high environmental sensitivity viz; Bewaarkloof Nature Reserve, Centres of Endemism, vulnerable and dangered eco=systems, heritage areas	1) No such Issue 2) Passes through land capable of arable culture 3)Fewer Traffic Accidents due to Terrain Conditions
Economic ripple effect (Job Creation-construction)	150000 people/during construction period	136066 people/during construction period
ASSESSMENT		**PREFERRED LINKAGE**

Rail Infrastructure and operational detailing has been done for the preferred option. . For determining the collection and distribution services, the existing bus/taxi routes, flow patterns, frequencies etc were surveyed and analyzed. This fed in to the determination of service description viz. Network, location of ranks, fleet required and frequency of operation from the stations to the settlements.

Employment considerations

Implementation of the two new commuter rail links (Polokwane to Mokopane and Polokwane to Jane Furse – linking to the proposed Molto Corridor) will create an estimated 208406

transient jobs during construction and an additional number of permanent jobs during operation that will be detailed in the detail feasibility assessment. Indeed, operations will see more decent and sustainable jobs created than just those within the rail operations. Public transport integration means that a seamless integrated service provision must be achieved. This, in turn, will norm the feeder systems, integrated ticketing, transparent institutional revenue share arrangements, safety and security arrangements, and the like – all leading to sustainable decent employment opportunities.

Integration and industry transition

Two most prominent benefits of the proposed new rail links are the industry transitional effects on the public transport industry in the area as well as the modernization and improvement in the quality and reliability of service provision to the commuters and general travelers along the corridors.

The industry transition will see the current service providers – both bus and taxi operators – become integrated into the formal sector. This will greatly contribute to the sustainability of the small public transport operators currently rendering services on the 2 routes. An indirect but equally critical value addition from the formalization of the businesses will be the widening of the tax net contributing to mitigating any additional fiscal burden that may be required to support both the creation and operation of the new infrastructure. Social benefits include a time-tabled, reliable, secure and comfortable mass transit service provision along the new corridors.

This assessment recommends that the Polokwane – Mokopane rail commuter service (Corridor A) as well as the regional passenger rail service from Polokwane to Jane Furse (Corridor D) be taken forward for detail feasibility consideration when the appropriate market demand indicators are fulfilled in the medium term.

Definition of Implementation Phases

It is important to adopt an incremental phase approach. By this method, the changing situation in the province can be taken care of, in 3 stages of implementation. These are defined as the following time horizons:

- **Short Term(5-10 Years)**
  - ✓ Demand on both the corridors would be better served by road based public transport mode like taxi, bus and possibly BRT.
  - ✓ LPDRT shares the findings with affected municipalities and PRASA with a view to ensure that the identified alignment is not compromised by conflicting developments and are preserved for future development of rail corridors as identified in the pre-feasibility study.

- **Medium Term (10-20 Years)**

  - ✓ Demand on both the corridors would be better served by road based public transport mode like taxi, bus and possibly BRT; but
  - ✓ LPDRT monitors market developments within the identified corridors and when market viability is reached (freight demand to be considered) , the rail option on these corridors be reviewed and confirmed through detailed Feasibility Study.
  - ✓ LPDRT shares the findings with affected municipalities and PRASA with a view to ensure that the identified alignment is not compromised by conflicting developments and are preserved for future development of rail corridors as identified in the pre-feasibility study.

- **Long Term(Beyond 20 years)**

The long term time frame has been segmented in phases to implement rail option along both the corridors.

Phase 1

- ✓ To start as soon as possible in the long term in order to provide a service level as it was originally planned for.
- ✓ The time horizon will be “as soon as possible”, which can be defined realistically as per the targets

Phase 2

- ✓ major improvements in quality and quantity of technology and passenger service are outlined now, which will be supplemented by the future results of the development of the country, in first place the demand-structure.

Phase 3

- ✓ this phase will be the perspective for the final layout of the system, showing the maximum of effort to be understandable under today’s knowledge.

D. OVERVIEW OF OPERATIONAL RESULTS

The major results of the dimensioning concerning the Operation Concept in the long term are summarized in **Table 1,** for giving a better overview on the planning status.

Table 1: Overview of Operations Measures for Improvement-Polokwane – Mokopane Corridor

Topic	Dimension	Long Term*- Phase 1	Long Term**- Phase 1	Long Term- Phase 2	Long Term ***- Phase 3	Comments
Demand	phd	13 600	13 600	34 250	61 000	given by Forecast
Peak	-	morning	morning	morning	morning	for dimensioning
Direction	-	M - P	M - P	M - P	M - P	for dimensioning
Distance	km	65	65	65	65	derived from Google
Max. speed	km/h	90	160	160	160	for commercial service
Travel time	min	65	56	56	56	per train
Circulation time	min	150	130	130	130	per train
Headway (th.)	min	8.7	8.7	3.47	0.98	theoretical value
Headway (pr.)	min	8	8	3	2 x 2	practical value
Nr. of trains	in service	10	10	20	60	train of 3 units
Nr. of units	in service	60	54	132	390	unit of 4 coaches
Train-kilometers	km/day	5 200	5 200	13 000	39 000	rough estimation
Unit-kilometers	km/day	15 600	15 600	39 000	117 000	rough estimation
Number of single tracks	-	1 x -	- 1 x	- 1 x	- 2 x	mixed service, commuter service only

Legend:		
	phd:	passengers per peak hour and direction
-	*:	with single track line of joint use: commuter + freight +Shosholoza Meyl
-	**:	with single track line for commuter service only
-	***:	only of theoretical interest

Table 2: Overview of Operations Measures for Improvement-Polokwane –Moloto Corridor

	Topic	Dimension	Long Term-Phase 1	Long Term-Phase 2	Long Term-Phase 3	Comments
Section: Polokwane - Lebowakgomo	**Demand**	pphd	13 000	33 375	202 750	given by Forecast
	Peak	-	evening	evening	evening	for dimensioning
	Direction	-	P - L	P - L	P - L	for dimensioning
	Distance	km	70	70	70	derived from Google
	Max. speed	km/h	160	160	160	for commercial service
	Travel time	min	49	49	49	per train
	Circulation time	min	120	120	120	per train
	Headway (th.)	min	36.69	14.29	2.35	theoretical value
	Headway (pr.)	min	30	10	2	practical value
	Nr. of trains	in service	2	6	30	train of 15 coaches
	Nr. of coaches	in service	30	90	450	coach with 530 pass.
	Train-kilometers	km/day	1	7 000	42 600	rough estimation
	Nr. double tracks (by calculation)*	-	0	1	1 x	only used by commuter service recommended
	Nr. double tracks (recommended)**	-	0	1	1 x	only used by commuter service recommended
Section: Lebowakgomo - Jane Fursa	**Topic**	Dimension	Long Term-Phase 1	Long Term-Phase 2	Long Term-Phase 3	Comments
	Demand	pphd	5 598	13 350	81 115	given by Forecast
	Peak	-	eveni	evening	evenin	for

			ng		g	dimensioning
	Direction	-	L - JF	L - JF	L - JF	for dimensioning
	Distance	km	71	71	71	derived from Google
	Max. speed	km/h	160	160	160	for commercial service
	Travel time	min	57	57	57	per train
	Circulation time	min	140	140	140	per train
	Headway (th.)	min	85.21	35.73	5.88	theoretical value
	Headway (pr.)	min	60	30	5	practical value
	Nr. of trains	in service	1	2	12	train of 15 coaches
	Nr. of coaches	in service	15	30	180	coach with 530 pass.
	Train-kilometers	km/day	1	7 000	14 000	rough estimation
	Nr. double tracks (by calculation)*	-	0	1	1 x	only used by commuter service recommended
	Nr. double tracks (recommended)**	-	0	1	1 x	only used by commuter service recommended
	Legend:	pphd: per peak hour *: calculation with unrealistic demand (theoretical) **: recommendation (practical)				